ELECTRICAL REVIEW

ILLUSTRATED.

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Electric Light, Power, Telephone, Telegraph and Scientific Progress.

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VIEWS, NEWS AND INTERVIEWS.

The use of electric lighting effects in the large stores of New York during the holiday season has been much greater than in any previous year, and will bring in very satisfactory returns to the local illuminating companies.

A new discovery of platinum and iridium has recently been made in the Mudgee district of New South Wales.

Besides being very vulgar, a slang expression is undoubtedly the most comprehensive of language, and especially so in its up-to-dateness and its popular understandableness, says the *Sun*. "Ah! yer trolley's off!" contemptuously sneered a scrubby little newsboy on Fulton street, Brooklyn, the other day, to a companion with whom he was endeavoring to straighten out some difference of opinion. And "Your trolley's off" is getting to be pretty generally used to express what has been indicated by "You're off your base." If Macaulay or Charles Lamb offer anything more terse or pithy, that would express to everyone just what everyone understands by "Your trolley's off," it would be worth quoting. Slang is, perhaps, richer in the history that touches the life and common experience of all the people most closely than most other words. Future generations may know the exact date when the trolley car was first used, but if they could discover just when "Your trolley's off" came into vogue, they would know better when electric trolley cars began to be in general use and common to the people.

In a recent horse race at New Orleans, Upward ran with an electric battery, which was not reported as a part of his equipment. The Board of Control decided to refuse his entry in the future and fined the jockey $25.

A steam shovel made by the Marion Steam Shovel Company has recently been converted into an electric shovel by the Chicago office of the General Electric Company, and the machine as changed is working in the clay pit of the Purington-Kimball Brick Company's brick yard at Purington, Ill.

The estate of the poet John Greenleaf Whittier included several investments in electric securities.

An electric and gas fixture manufacturer says that the tendency of the times is toward the installation of straight electric fixtures, and that combination gas and electric chandeliers and brackets are becoming slowly obsolete. He explains this by the fact that the service of local illuminating companies is becoming more reliable every day and also by another important fact, that supervising engineers are insisting upon first-class wiring and installation. The new addition to the Vanderbilt building in this city will contain no gas pipes, and entire dependence will be placed upon the electric current for illuminating purposes.

Platinum can now be drawn into wire strands so fine that 27 twisted together can be inserted into a hollow the size of a hair.

Incandescent electric lamps have been adopted in Madras as an ornament to the head of the horses driven in harness by the Jaghirdar of Arni. Two lamps, provided with powerful reflectors, are attached to the harness between the ears of the horses, the lamps being connected to a battery placed in the body of the carriage. The novelty of the arrangement attracted much attention.

An enterprising electrician, now in Paris, has electrified people by swindling them out of $400,000. Now his victims know what Herz them.—*Lowell, Mass., Courier.*

While the office boy was endeavoring to get one of our many appreciative subscribers the other evening over the telephone, the wire was crossed and he inadvertently heard the following conversation:

"Yes; don't forget now. Say, May, May, get a little closer to the mouth-piece. Listen, now." (Sounds like a cow drawing her foot out of a mud-puddle on a rainy day.) "Did you get that?"

"Yes."

"Well, now, send me one." (Same sounds are repeated.)

"Ah! That last one was a beauty. Good-bye."

Then the office boy went out into the cold entry and kicked a black cat that had been holding concerts during the busy hours of "going to press."

A new switch is one arranged in connection with a door lock, so that when the key is turned in the lock to open the door the lights in the room are also turned on.

The danger from shocks caused by current from a live wire traveling down the stream of water to the fireman holding the nozzle has led to the devising of an insulated support for the nozzle, which grounds the current and at the same time is of great help in holding the stream steady.

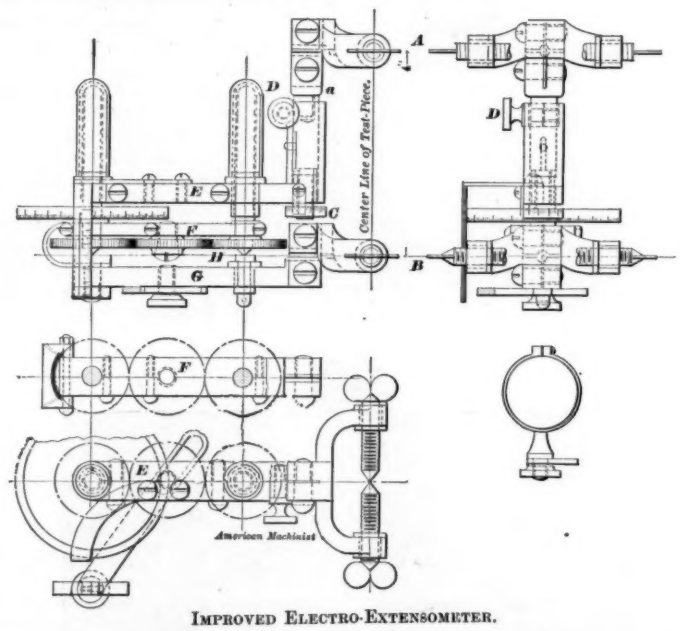
Improved Electro-Extensometer.

BY CHAS. L. HEISLER, M. E., IN THE "AMERICAN MACHINIST."

The device illustrated by the accompanying drawing belongs to that class of apparatus intended for accurately measuring elongations of test pieces, truss rods, etc., when subjected to strains in the testing machine, or in structural work.

The instrument consists essentially of two centering yokes *A* and *B*, each fitted with suitable screws for securing and centering the test piece. The upper yoke *A* is connected to the instrument by means of the tram joint at *a*, and is adjustable vertically through a limited range with respect to the apparatus by turning the differential screw *C*. After adjustment it can be secured rigidly by the clamp *D*.

Upon the screw bar *E* are mounted two suitable inclosed micrometer screws, which



IMPROVED ELECTRO-EXTENSOMETER.

are connected at their lower extremities by the gear bar *F*, and the corresponding gears, as shown.

The outer micrometer screw is provided with a graduated wheel, its circumference being divided into 250 parts; the micrometer screws are each threaded 40 per inch, thus giving a vertical screw travel of $\frac{1}{10000}$ inch per division on the wheel. Each graduation of the vertical scale corresponds to two revolutions of the screw.

When desirable to facilitate reading of the micrometer, a lens is mounted upon the lower touch bar *G*, so as to be directly opposite the graduations at the intersection of the micrometer wheel and vertical scale.

The lower centering yoke *B* is connected to the touch bar *G* by means of a flexible steel plate, which permits a slight amount of deflection of the test piece without effecting the accuracy of the apparatus, other than the inappreciable error resulting because of measuring along the chord of the arc formed by the center line of the test piece. The upper yoke *A* is provided with a like plate. The flexible plates in combination with the pointed centering screws provide a desirable form of swivel connection between the test piece and measuring device.

The touch bar *G* is hinged at its outer end to the gear bar *F*, to accommodate an increase in length of the test piece held between the centering screws, by swinging away from the lower touch ends of the micrometer screws. These again coming in contact with the touch bar *G* when the screws are adjusted for the elongated test piece, the outer screw always coming in contact first, because of a slight amount of springing in the hinge connecting the gear and touch bars *F* and *G*. The inner screw comes last in contact with an electrically insulated touch pin *H*, completing the circuit inclosing a Leclanché cell and bell, instantly indicating the contact, however slight and with surprising delicacy.

To attach the instrument to a test piece, the micrometer wheel and the differential screw *C* are placed at zero reading. The piece is properly secured by the centering screws in the yokes *A* and *B*. The screw *C* is adjusted so the bell just ceases ringing, indicating that the slightest downward movement of the micrometer screws from zero reading will sound the bell. Then after the clamp *D* is made tight the instrument is ready for measuring any elongation of the test piece, however small.

Supposing the piece has been slightly elongated because of some applied stress; then to measure this the micrometer wheel is screwed down until the bell sounds, when it is "backed off" until the bell just ceases ringing. Evidently the arrangement and relation of the parts are again precisely as before the elongation, and the reading on the wheel gives a measure of the increased length of the test piece.

To measure elongations of test pieces, or rods of any length over four inches, the apparatus is disconnected at the joint *a*, and suitable connecting bars are inserted to give the required and proper distance between the centering screws. No other adjustments are necessary. The several parts are made adjustable for any slight wear of bearings.

From the foregoing description it will be apparent that by a single adjustment, and but one reading, accurate measurement is obtained directly, and without computation.

The apparatus was designed by the writer about four years ago, after making many measurements with other forms of instruments; although original, it is not patented.

The Cold Northwest Warmly Appreciates the "Electrical Review."

TO THE EDITOR OF ELECTRICAL REVIEW:

Enclosed you have check for $3, for which please extend my subscription one year from the time it expires.

I think the ELECTRICAL REVIEW is the best all-round electrical paper published. I am particularly interested in its telephone news.

A happy new year, and may the REVIEW continue in its successful career. Very truly yours, (Signed) GEO. D. SHERMAN,

Manager Telephone Exchange.

Stillwater, Minn., December 27th, 1892.

WORLD'S FAIR NEWS.

In a report to the Board of Control, Director General Davis makes a strong protest against any further delay in issuing the rules that are to govern the Exposition, and the rates that are to be charged exhibitors for light, power, water, etc. He says that the Exposition has already lost many valuable exhibits on account of the delay, exhibitors cancelling their requests for space because they were not able to learn from anybody what the charges would be.

The International Exhibitors' Association, of the Stewart Building, New York, will be informed by telegraph on these points at the earliest possible moment. It is in a position to care for the interests of Eastern exhibitors who are enabled to place their goods in its hands, with confidence that their exhibits will be satisfactorily placed and looked after by the Chicago representatives of the Association. Already a large number of prominent exhibitors have taken advantage of the opportunities offered by the Association.

Rules for the Fair were agreed upon by the national board last October; these rules embraced all the rates for power, light and fuel. Because the Chicago directors refused to approve of the rules they have not yet been announced.

Director General Davis says on the subject: "At this date, December 20, not an officer of the Exposition has been authorized to state what the probable cost will be. Exhibitors of electrical and machinery articles decline to accept their space until this matter is settled. The work of the departments and the general work of the council of administration has been greatly improved, but more can be done. As a whole the outlook for efficiency and success is better than ever before."

The comments of Mr. Davis have caused a stir. They will be acted upon at the next meeting of the Joint Boards of Conference and Control, which met last week.

The World's Fair Sunday Opening Association has received returns from inquiries sent out asking for an expression of opinion on the question of opening the Fair on Sunday. The committee was composed of Mayor Washburne, Postmaster Sexton, Rev. Dr. Thomas and James W. Scott. The replies show that 75 per cent. of the answers favor open gates on Sunday. Samuel P. Putman is here with a petition of 20,000 residents of the Pacific coast asking for Sunday opening. A monster petition from the citizens of Chicago will also be presented to Congress.

The collection of foreign exhibits will be enormous. Every country on the face of the globe will be represented in a greater or less degree. Already a considerable portion of the foreign exhibits have arrived and are ready to be put in the spaces provided for them.

The interest which is being displayed abroad is said by observers to be remarkable. Everybody in Europe talks about the event, and millions of visitors will be attracted to Chicago. In order to make matters as agreeable as possible for foreign exhibitors, the custom house authorities will take special care to be as easy with the imports as the duties will permit.

Chief Comstock, of the Foreign Division of the Treasury Department, is at present in Chicago. He is consulting with the World's Fair managers.

The magnitude of the Exposition was ably set forth by James Dredge, of the Royal Commission, who visited Chicago. He said that the fact that 85 per cent. of the space had been applied for by foreign exhibitors showed the great importance attached by foreign manufacturers to a representation at the Exposition. England's building will compare favorably with any on the grounds.

No doubt is entertained that every State building on the grounds will be ready for occupancy in time for the opening. Exhibitors will find it absolutely essential to be present during the Exposition, or to be represented by responsible representatives.

Advices up to date to the "International Exhibitors' Association," of the Stewart Building, New York, indicate that exhibitors are still clamoring for space in the World's Fair Buildings.

The final allotment of space in the Liberal Arts Building will be made on January 2. This building is the great center of the whole system. The illness of Chief Allison has delayed the assignment of space. Requests for five times more than the available space have been received. Manufacturers seem to be fully alive to the advantages to be derived from an exhibit.

Foreign governments and exhibitors are showing increased interest in the Fair. The custom house officers announce the arrival of six cars of building material for the

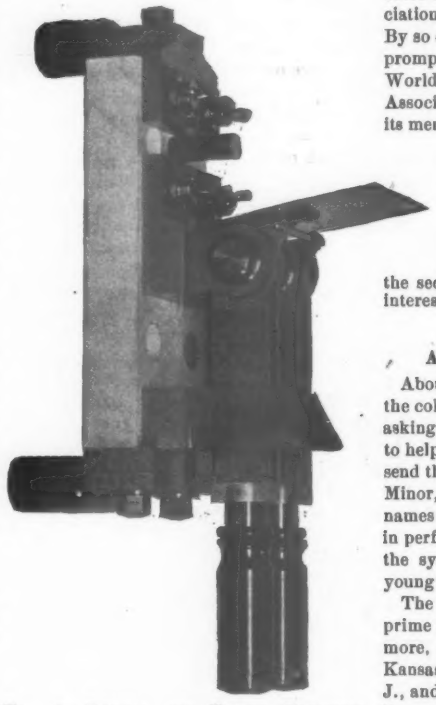


FIG. 1.—SWITCH FOR EDISON ELECTRIC LIGHT AND POWER COMPANY, OF SAN-FRANCISCO.

German Building, one car for the French Building and one car for the Japanese Temple. Russia has made application to erect a grand dome, 70 feet high, over its court in the Manufactures Building. The Swedish Building has been shipped from Stockholm and is daily expected.

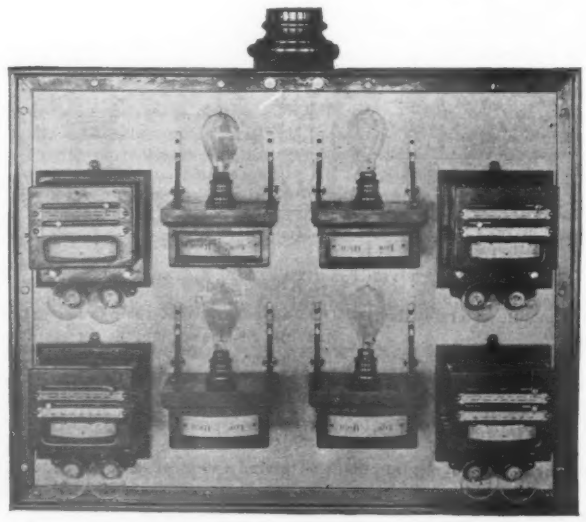


FIG. 2.—MEASURING INSTRUMENTS FOR THE EDISON ELECTRIC LIGHT AED POWER COMPANY, OF SAN FRANCISCO.

It is estimated that 16,000 car loads of exhibits will be received at the grounds between now and May 1. Reducing the proportion to figures would mean a train of cars over 100 miles in length. A representative is in Chicago from the Colony of South Africa. He reports great interest in the Fair in that remote district, especially among people engaged in mining.

The number of guards employed to look after the grounds and exhibits has been increased to 500, and a further addition to the force is to be made soon.

Exhibitors in all lines of business are urged to get their exhibits in as soon as possible, so that they may be included in the mammoth official catalogue of exhibits. This catalogue will be an elaborate publication; and a separate portion will be devoted to each department.

Many eastern manufacturers are writing to the World's Fair management for information regarding the entry of exhibits, their care during the show, etc. Replies are seldom sent. The best available information for such inquiries can be obtained at the office of the International Exhibitors' Association in the Stewart Building, New York. By so doing, eastern exhibitors will be more promptly answered than by troubling the World's Fair committees in Chicago. The Association is using every effort to see that its members get available information, and at the same time receive an equitable allotment of the space asked for by them.

Intending exhibitors wishing the Association to assist them regarding their exhibits, should immediately send their authority and power to the secretary of the Association, and their interests will be looked after at once.

If young men will send their names and addresses to any of the following they will be supplied with necessary details and information. No exorbitant initiation fee or dues are required: G. Clifton Minor, care of Chesapeake and Potomac Telephone Company, Baltimore, Md.; Edwin Norton, care of *Newton Daily Republican*, Newton, Kan.; Edmund H. Perry, 24 Benson street, Bloomfield, N. J.

An Amateur Electrical Union.

About four months ago there appeared in the columns of an electrical journal a notice asking any young men who would like to help form an electrical union to please send their names and addresses to G. Clifton Minor, of Baltimore, Md. A few sent their names and found that he wanted their help in perfecting an amateur electrical union for the systematic study of electricity among young men.

The plan was decided upon, and the prime movers, G. Clifton Minor, of Baltimore, Md.; Edwin Norton, of Newton, Kansas; Edwin H. Perry, of Bloomfield, N. J., and Samuel H. Houston, of Pineville, La., went immediately to work to perfect it. They have framed a constitution and by-laws, and are otherwise employed to make the union a success. It has about 25 members at present, and with these they expect to achieve grand results.

The leading electrical journals are to be kept on file, and the subjects in them are to be debated upon. It is contemplated to obtain the services of electrical engineers to lecture before the union.

Westinghouse News.

Mr. Thomas W. Lawson says: "Since the recent rise in Westinghouse from 25 to 40, and subsequent decline to 30, the 'street' has been filled with rumors of the cause. Some of the guesses are of such a nature that I feel called upon to give the real facts for the benefit of many who have bought Westinghouse on my recommendation. The rise from 25 to 40 was not caused by the manipulation of a pool. At the request of some strong capitalists of New York and Boston, I made an examination of the affairs of the Westinghouse Company, and as a result purchased for them the greater part of the stock sold between 25 and 40. This was the cause of the rise. The stock purchased has gone into the hands of people who can, if they will, buy the entire capital stock, and not curtail their regular business. Not 1,000 shares of the stock would probably come onto the market if the price went to 5 or to 50.

"The drop from 40 to 30 was not caused by the inability of any pool to carry their holdings. When the price got to 40 my friends had not received by a few thousand shares the amount required, and probably could not without bidding it up to 50.

"I agreed to secure it between 30 and 40, and have done so. This was the cause of the decline. The bulk of the stock sold from 40 to 30 and back to 35, has gone to join the stock bought on the first rise. This stock has not gone into hands unfriendly to the present management of the Westinghouse Company; on the contrary, into the hands of those who believe most thoroughly in the methods and ability of George Westinghouse, Jr.

"As to the anxiety of the Westinghouse Company to sell out or consolidate at 25 to 40, or their being pressed for working capital, one illustration will suffice. When the stock was selling at 37, I made an offer to the company of 45 for the entire treasury holdings, some $1,100,000, and it was refused only on account of the price, as the stock would have gone into hands satisfactory to the present management.

"With perhaps as thorough knowledge of the value of Westinghouse stock as any one outside the management, I unhesitatingly advise my friends to buy Westinghouse at anything under 50. It is cheap at 50 independent of any revenue derived from lamp or lamp making business. It is cheap at 75 with its present business and the addition of the enormous revenue that must come from the new lamp, which, notwithstanding the trash that is put out about it, is in every way a complete success.

"It is cheap at 55 in the event of consolidation, for no sensible man would be guilty of seriously supposing that such able men as Chas. Francis Adams, August Belmont, Brayton Ives, Henry D. Hyde and the other equally able men who compose its management, would allow a consolidation that would not give stockholders at least 60, and it would certainly be a reflection on the brainy management of the General Electric to say that they would hesitate in taking $10,000,000 of their eight per cent. stock to purchase a property that on its present earnings would pay its own dividend and leave a surplus of $700,000 to $800,000 yearly."—*Boston News Bureau.*

Edison vs. Westinghouse.

In the United States Circuit Court at Pittsburgh, on December 24, a bill was presented by the Edison Electric Light Company asking for an injunction to restrain the Westinghouse Electric and Manufacturing Company from selling electric lamps, which are infringements on the plaintiff's patents. Judges Acheson and Buffington fixed December 27 for a hearing. The defendant company filed a general denial in answer to the bill, which alleges that the Westinghouse Company is continuing to manufacture and sell the incandescent lamps. The court decided to follow the form of the decree of the Circuit Court of New York in the Sawyer-Man case, and an order to that effect was made.

A New Switchboard for the San Francisco Edison Company.

One of the handsomest and largest switchboards in the world has just been completed at the Schenectady works of the General Electric Company for the first station of the Edison Electric Light and Power Company, of San Francisco. It is constructed of slabs of highly polished white Italian marble mounted on an iron frame, and is 56 feet eight inches in length.

The board provides for the distribution of 2,900 kilowatts, or 14,666 amperes at 150 volts, from 12 generators of the General Electric Company's multipolar type, directly coupled to triple expansion engines. Ten of these dynamos are of 200 kilowatts; two are of 100 kilowatts capacity, and all are arranged on the three wire system.

The main and auxiliary bus bars run the entire length of the switchboard, and are set in a rack in the rear. They are so arranged that they can be cut in two at the center by means of heavy switches on the face of the board. This allows of the operation of the station under four different potentials at the same time.

Provision is made for 24 feeders. Each feeder is equipped with two ampere meters and three switches. Each switch has two blades, one for the main and one for the auxiliary bus, the positive and negative switches of each set being provided with safety catches.

A novel feature in these last named switches is the mica covering for the fuse, which is hinged and can thus be readily raised where necessary for the insertion or adjustment of the fuse.

A special 30 point indicator switch is mounted on the board, by means of which it is possible to read in the station the voltage at all the feeding points in the outside system.

Each dynamo is provided with an ampere meter, a dynamo field regulator and two switches, each double-bladed, so that the dynamo may be thrown upon either the main or auxiliary bus bar.

The ampere meters are mounted on bases of marble similar to that of the board, and have highly finished brass covers with fronts of bevelled heavy plate glass. The regulators are also fitted with white marble tops.

Besides the apparatus already mentioned, the board is equipped with the necessary pressure and galvanometer switches.

Two ornamental pillars supporting small auxiliary boards are to be erected at either end of the board. Upon these will be placed the dynamo galvanometers and pressure indicators.

All connections are made at the back of the switchboard. Those between the instruments and the bus bars are through flexible copper cable of 1,500,000 circular mils cross section.

The following items relating to the work on the board may prove of interest. The board is built up of 26 marble slabs, each of about 25 square feet of surface, and weighing in the aggregate over 7½ tons. The weight of the main switchboard, complete and fitted for the present requirements of the station, is 37,000 pounds; 5,000 pounds of copper connecting cable, 6,000 pounds of copper bus bar and 10,000 pounds of high conductivity metal were used in its construction.

Each dynamo switch of 1,500 amperes capacity weighs 150 pounds, each double bladed feeder switch 100 pounds, and the large bus bar switch 200 pounds.

Our illustrations show the switchboard as it stood in the factory a short time before completion. When erected in its place in the station at San Francisco it will be further adorned by the addition of an ornamental cornice and base board.

From the above description the magnitude of the task undertaken by the General Electric Company can be appreciated. It called for unusual resources, the floor space alone necessary for its erection being equivalent to that of a moderate sized factory. Such excellent workmanship, both electrically and mechanically, marks an advance in the electrical art, and to the engineering department of the General Electric Company at New York, which designed this board, should be awarded the meed of credit which is its proper due.

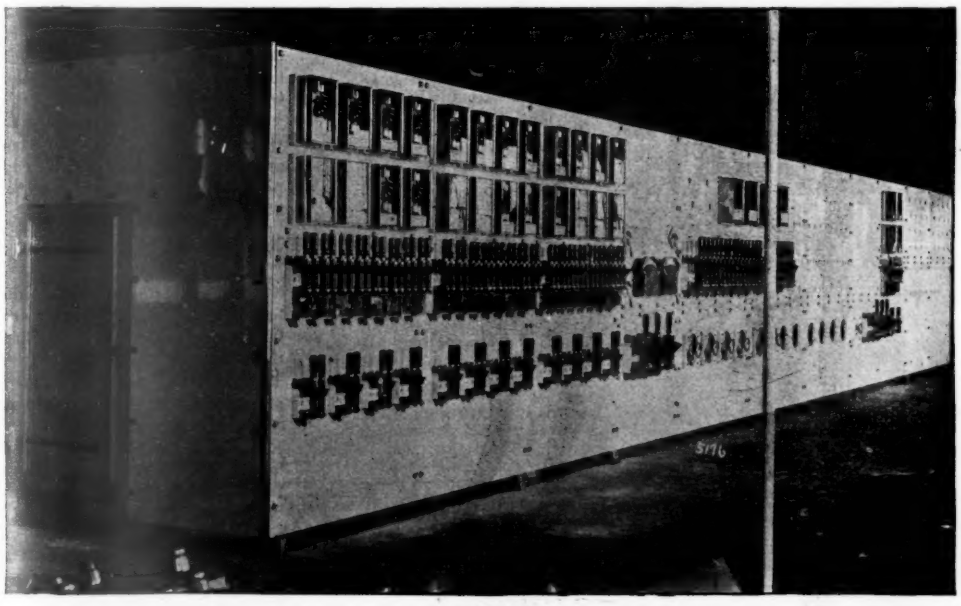


FIG. 8.—NEW SWITCHBOARD FOR THE EDISON ELECTRIC LIGHT AND POWER COMPANY, OF SAN FRANCISCO.

Now is the Time to Act.

The resolution introduced into Congress by the Hon. Amos J. Cummings is likely to lead to a desirable overhauling of the present antiquated laws governing second-class postage and render impossible injustice or favoritism on the part of the Post Office Department towards particular publications.

Those who are desirous of helping along the good work cannot do better than to communicate with any member of the Postal Committee with whom they happen to be acquainted. The chairman is the Hon. John C. Henderson, and his address is House of Representatives, Washington, D. C. Those having no acquaintance with a member of the committee will do well to write to their own Congressman, asking him to turn the letter over to the chairman of the sub-committee having the matter in charge. In this way intelligent opinions concerning the law and needed changes can be brought before those who make the laws.

The publisher who neglects the present opportunity will have only himself to blame if he suffers for years to come from the same sort of annoyance that has vexed him in times past, and of which the experience of *Printers' Ink* is such a conspicuous example.

MICA.

BY C. HANFORD HENDERSON IN "POPULAR SCIENCE MONTHLY."

The name mica is not that of a single mineral, but is a family cognomen, which includes a number of varieties. With the outward attributes of the family we are all familiar, for under the common name of isinglass it forms a small part of the stock in trade of every householder. The family is one of some importance in mineralogical hierarchy. All are shining members, and are alike in splitting into extremely thin leaves or plates; in being more or less transparent; in being highly elastic; and in having certain ingredients in common. There are seven well-defined minerals which lay claim to the family name, besides an extensive list of relatives which have been formed by alteration or exposure to air and water. The series runs from the compact, glistening mica found in granite and gneiss, through many gradations of hydrous micas, until we reach the ordinary soapstones and clays. But the name properly stops when the mineral loses its glistening surfaces, for then the Latin word *micare* (to shine) no longer applies. Our German friends call it glimmer, a name whose significance is readily seen.

The location of the quarries has been largely accidental. So far as I have been able to learn, the first one opened was the Sinkhole in Mitchell county, N. C. The spot was marked by the existence of trenches many hundred feet long in the aggregate, and in places fully 20 feet deep. Large trees growing on the debris indicated that the workings were very ancient.

Then, as now, the mountaineers were largely guided in their search by the ancient workings. These were probably made by the aborigines, and were also for the purpose of obtaining mica. The imprint of their stone implements may still be seen in the decomposed stuff at the sides of the opening. What these people used the mica for is still problematical. Large plates of it have been found in the mounds of Eastern Tennessee, and would indicate that it had domestic application, or was used for personal decoration. The mica is seldom prepared for market at the quarry, but is taken to a conveniently located glass-house. This generally means a transportation of several miles. Frequently the quarries are on steep mountain sides, and are only connected with the outside world by the roughest sort of trails. In this case the mica is "packed" down the mountain on the backs of men to the wagon road in the valley below. At the glass-house the mica is put into shape for shipment. The blocks vary greatly in size. One from the Wiseman quarry, near Spruce Pine, is reported to have been six feet long by three wide. Pieces a yard in diameter have been obtained at the Ray quarry, in Yancey county, and similarly large plates have been found in Siberia, but these are exceptional. The average size of a block is a little larger than the page of a magazine, and is generally less than six inches in thickness. It separates very readily into sheets parallel to the base of the prism. It is estimated that this cleavage may be carried so far that it would take 300,000 of the mica plates to make an inch. It is needless to say, however, that such a thickness is not suitable for use in stoves and furnaces. The mica is generally split into plates varying from about one-eighth to one-sixty-fourth of an inch in thickness. In preparing these plates for market, the first step is to cut them into suitable sizes. Women are employed in this work, and do it better than men. The cutter sits on a special bench which is provided with a huge pair of shears, one leg of which is firmly fixed to the bench itself, while the movable leg is within convenient grasp. It is requisite that the shears be sharp and true, for otherwise they will tear the mica. The patterns according to which the mica is cut are arranged in a case near at hand. Generally they are simple rectangles, varying in size from about 4 square inches to 80.

The cutter selects the pattern which will cut to the best advantage, lays it on the sheet of mica, and then, holding the two firmly together, trims off the edges of the mica to make it correspond with the pattern. When the cutter completes her task, she has all the mica piled away in little bundles under their corresponding patterns, while the scrap falls in a glistening heap on the floor. The cleaning process comes next. The cleaner must examine each sheet of cut mica by holding it up between her eyes and the light. If there be any imperfections, they must be removed by stripping off the offending layers of mica until a clear sheet remains. The cleaning is done by means off a sharp pen-knife—and considerable discretion. It is quite easy to tear away the entire sheet and having nothing left for one's trouble. Both the cutting and the cleaning are tiresome routine operations, yet there is a certain fascination about tearing the mica to pieces that few have philosophy enough to resist. Finally, the cut and cleaned mica is put in pound packages and is ready for market. There is an enormous waste in the process of preparation. One hundred pounds of block mica will scarcely yield more than 15 pounds of cut mica, and sometimes it is even less. The proportion varies, of course, with different localities.

The chief use of cut mica is in stoves, and its comparative cheapness has made possible the luminous—not to say artistic—wonders which constitute the latest and most cheerful creations of the stove men. The sheets are also used in the peep-holes of smelting furnaces, in lanterns, in shades, and in the port-holes on board naval vessels, where the vibrations would soon demolish less elastic glass. Mica is an excellent non-conductor, and of recent years has been cut to some extent into narrow strips for use in the construction of dynamos.

The scrap mica was formerly thrown away, with the exception of a small quantity used as a lubricating material, but it has recently found a market in several new directions. Old waste heaps are being bought up for a few dollars a ton, and their contents cleaned by being passed through a big mill. This is simply a rotating cylinder of coarse wire screen, with its axis slightly inclined to the horizontal. The scrap is fed into the upper end of the cylinder, and slowly discharges itself from the lower end. As it makes its way from end to end, the sand and trash fall through the meshes of the screen.

The cleaned scrap is then ground into a coarse powder and distributed to the various industries requiring it. Large quantities are used in the manufacture of wall paper. The mica produces a sparkling surface which is thought to be decorative, but at best the effect is somewhat bizarre. Considerable amounts are used to produce the snow effects on Christmas cards, and in stage scenery and other tinsel; while smaller packages, under the name of diamond dust, are sold as powder for the hair. Much of the ground mica is sent to France, and this, oddly enough, when the East Indian sheet mica is pressing our own pretty heavily in the home market. The Latin world used the mica dust to strew over the Circus Maximus, while mediæval Europe knew the golden and silver scales as cat-gold and cat-silver.

Three Rivers Electric Plant Case.

The judgment in the case of the Royal Electric Light Company, of Montreal, against the City of Three Rivers, Mich., was rendered recently by Judge Bourgeois. The suit was brought by the Royal Electric Company against the city to force it to accept the electric light plant on the plea that it was up to the contract. The city objected on the score that the plant offered was not up to contract. The judgment made out the plant as not being up to contract all along the line, and dismissed the Royal Electric Light Company's action.

Wanamaker Again Urges a Postal Telegraph System.

The annual report of the Postmaster-General of the United States for the fiscal year ending June 30, 1892, is an able and clear exposition of the workings of the post office department. Mr. Wanamaker again brings up the postal telegraph question, and, for the fourth time, urges its consideration—"not for revenue to the department, but for the public good." A brief of his remarks on the subject follows:

I am fully convinced that the government will never properly do the postal work committed to it until it uses electricity in some form; and, therefore, I advocate the utilization of both the telegraph and the telephone at the earliest practicable day. To receive letters and other mail and store them away for shipment in bulk, more or less slowly, once a day or, even, every hour, when a wire and a telegraph instrument for the needed quick messages or telephone might connect the major part of the post offices, seems an antiquated anomaly. It is true that a large part of the mails must always go by rail, but there is another considerable part that seeks quicker transit, that does not find convenient the 10,000 railroad telegraph offices, often distant from villages, that does not find the telegraph tariff within the reach of working people. The mail and the telegraph are the life currents of business, and, to a large degree, of social life, and the private monopoly of either system must result in creating a preferred class, to whom high rates may not be objectionable. The humbler citizens must do without.

It was said long ago that the telegraph must be a monopoly, and so is the postal system; but the difference is that one is operated for private gain and the other for the public good. The government follows a settler across the plains and into the mines, and establishes a post office, in order that his family may have letters and newspapers, and be more content in a frontier home. The telegraph goes where it can find paying business only; and so it falls out that only a sixtieth part of the people of the United States, owing not to the need but to the inconvenience and the charges, employ the telegraph. The post office helps to settle, serve and satisfy the country—literally, to make the country—and, of all its adjuncts, the most important, that which would afford the quickest mode of communication between families near and far, apparently, cannot be made available in any way.

The fact is that, in some respects, the telegraph seems to get farther and farther away as the capital and power of the great corporations increase. Many telegraph companies have been established from time to time, but to-day there are but two independent companies. All but one have been in some form identified with the one corporation, and the one to be excepted, that is not yet known to have surrendered, is admittedly operated in concert with the other by joint traffic agreement. Practically, so far as the public is concerned, there is but one telegraph company, and however ready parties might be to invest capital in a company to erect lines and contract with the government for a low rate limited postal telegraphic service, the fear of bankruptcy, by reason of such formidable opposition, debars all such enterprises. It is not alone the powerful syndicate of owners of the telegraph company that must be met and persuaded, but there are other interests connected with the telegraph business that stand out against all measures looking to a telegraphic service in any form by the government.

This enormous business, producing gross revenues nearly one third as large as the entire revenue of the post office department, increases every year. Last year the increase was $672,078, and each year the amounts added to the surplus make the property more and more valuable, as there will probably be stock dividends in the future as in the past. I am pleased to have the company's official statement proving that the agitation for postal telegraph has not, as some argued, impaired the value of "vested rights."

All these facts are stated here for two reasons:

First. To show the growing power and increasing independence of the rivals of the post office department in the message carrying business.

Second. Respectfully to suggest the propriety of an inquiry into the cost upon which telegraphic charges are based, in the interest of the people who expect the post office department to treat all questions that concern correspondence.

The present rates charged average 31.6 cents and are said to cost 22.3 cents per message, gross. Naturally, as the business increases the rate of expense becomes less.

It may be said that operators are paid more in this country than in foreign countries, and that that is a reason why rates should be higher. But the fact is known that American operators perform double the amount of work usual for operators abroad. The bankers and the speculators who, it is stated, are the principal clients of the telegraph companies, may be content with present rates, but the resolutions of boards of trade, chambers of commerce, and working people's organizations sent to the department show that business people generally, and wage people almost wholly, are far from being satisfied. And from the best information I have I believe that a telegraph company could make a great deal of money on a uniform 25 cent 20-word message to all parts of the country. I make no doubt but that this rate could be afforded if the telegraph company had the use of the post office machinery, as proposed.

The increase of business on lower rates would be so large that the profits of the telegraph company, in my judgment, would not be diminished. It cannot be questioned but that the government, by reason of what it would save in the use of existing postal machinery, could easily by this time have offered much lower rates than the present telegraph charges if it had continued to operate the lines it begun. The people think much more about these things than they are commonly supposed to, and they are restive under conditions which they feel that the government should change.

I have never, as you know, advocated the purchase or construction of telegraph lines by the government. The plan I favor does not increase federal offices or officers, requires no outlay of capital, and with the use of a 'phone puts a telegraph office, without cost of rent, heat, light or clerks, as close to every citizen as the post office now is. It is now known by accurate data that the telegraph offices, as now located, average a distance from the post offices, which are usually in the center of population, as follows: In the New England States, 4 miles; Middle States, 3; Southern States, 9; Western States, 7; Pacific States, 13.

There are large areas of the country without telegraph offices, but they are supplied (and must be even more fully supplied) with post offices.

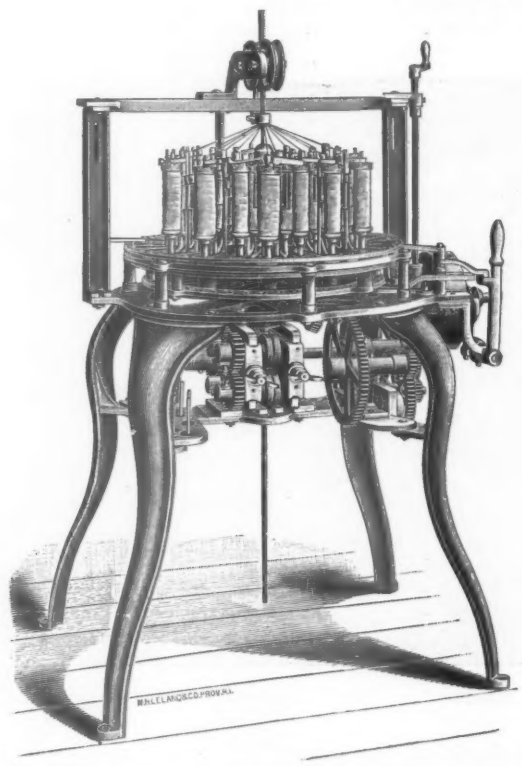
My proposition is to make a contract with some telegraph company to connect post offices by telegraph, or telephone, commencing with the most important offices and proceeding gradually in the order of probable usefulness. I would reduce the cost of telegrams by the use of post office buildings, already owned or rented, heated and lighted, by the use of telegraph stamps, by the collection of messages in street or house boxes, and the delivery by carriers and by the use of telephones, which do not require skilled operators. I would contract with a telegraph company to perform the service with its own operators for a fixed sum per message, which sum the post office department would charge the public, adding a one cent stamp for local delivery and a special delivery stamp when instant delivery was desired.

There is in this no government ownership, no outlay of government funds, no increase of the civil list, but the simple utilization of present buildings and forces in perfecting the message carrying business. The government permits the use of a 10-cent special delivery stamp, by which a piece of mail is hurried from the moment it appears. The limited telegraph project proposes to use a 15 or a 20, or a 25 cent telegraph stamp, collect the message at any mail box, and forward it by telegraph, that it may reach its destination in an hour instead of a day, or in a day instead of a week. The introduction of the house collection boxes, from which telegrams would be collected, would put every house in electrical communication with every other house. The relations of the telegraph companies would remain as they are; government would be simply a party to a contract.

There is in my judgment no impropriety in the suggestion for inquiry by the Interstate Commerce Commission or by Congress into the various phases of this subject, and into the question of the proper relation of the telegraph and the telephone to the mail. The public are in earnest for a telegraph service as convenient as the mail and for the lower rates that can be afforded.

I pointed out in my last report that the telephone patents expired in March, and that we should then probably see combinations and monopolies, as with the telegraph. Considerable discussion has resulted. It has been diverting to note that the vigorous denunciation of one monopoly has only been equaled by the onslaughts on the other, and many have found pleasure, and logic, too, as they suppose, in denouncing one and not the other.

At the small and suburban post offices electrical communication should be established with other post offices and with telegraph offices. Numberless advantages for local as well as distant service occur to any one. Weather reports would be spread, announcements of meetings heralded, physicians called and countless errands done. The use of the telegraph would be greatly increased; so with the use of the telephone. And with it all the volume of the mails would grow, and, what is more, the postal service would really be fulfilling its constitutional purpose of transmitting intelligence.



NEW CIRCULAR LOOM OF THE NEW ENGLAND BUTT COMPANY.

The Lunkenheimer Company.

The increased demand for the Lunkenheimer brass and iron specialties, and the introduction of new products, has compelled the Lunkenheimer Brass Manufacturing Company, of Cincinnati, to double their capital to $500,000, and as soon as possible their manufacturing facilities. This will place them in position to give all orders even more prompt and satisfactory attention than heretofore. The company will, after January 1, 1893, transact its business as The Lunkenheimer Company, with officers as follows: Edmund H. Lunken, president; C. F. Lunkenheimer, vice president and treasurer; D. T. Williams, secretary.

The E. W. Bliss Company, Limited.

The past twelve months have witnessed by far the greatest enlargement and most extensive improvements in the works of the E. W. Bliss Company, Limited, of Brooklyn, which have taken place during the history of the concern.

After amalgamating with their business that of the Stiles & Parker Press Company, the latter decided to move their entire plant to the Brooklyn works. Partly to accommodate the increase of business in that direction, the company put up an additional building 150 feet long by 90 feet wide and six stories high.

The machine shops now occupy the entire block bounded by Adams, Pearl, John and Plymouth streets, and enclose in the center an erecting shop for heavy machinery, spanned by a 25-ton electric traveling crane.

A large number of new machine tools have been put in and the Bliss Company are building some large boring and milling machines specially adapted for their own peculiar requirements. Gigs and special devices for the rapid and accurate production of standard machines are being put into use more extensively than ever.

The company has also equipped a portion of the works with special machinery for the manufacture of Whitehead torpedoes and torpedo guns, which they are making on contract with the United States Navy Department. The development of this branch of the business has called for much mechanical skill and elaborate investigations, not to speak of the large investment.

All of the departments have been well filled with orders during the year. The prospects are thoroughly good and the company expects to make further extensions of its facilities.

New Circular Loom of the New England Butt Company.

All manufacturers of insulated wire will be interested in the new 24 warp circular loom, with underneath feed, illustrated in this issue of the ELECTRICAL REVIEW. This machine is one of the improved pieces of apparatus recently turned out by the New England Butt Company, of Providence, R. I., and is of the high standard that the imprint of this company always assures. In the covering it makes, the thread runs parallel with the wire, which has a tendency to strengthen the wire and keep it from sagging when placed in cables. The underfeed pushes the wire through so that the covering is neat and close, and so arranged that if there are two or more coverings, the one nearest the wire can be more open by means of a longer stitch. This is accomplished by a slight change in the gear. The outside covering, of course, can always be made as tight as desired.

The New England Butt Company is crowded at the present time with orders for its braiding machines of various kinds, and is constantly turning out work of the finest quality. In addition, the ingenious members of the practical staff, under the able supervision of Supt. John McCahey, are constantly making improvements and keeping fully abreast of every demand in electric wire circles.

The Suit Against the Perkins Company.

A motion was to have been argued before Judge Shipman, in the United States court at Hartford, Conn., on December 24, to discontinue one of the three bills of complaint of the Edison Electric Light Company *vs.* the Perkins Electric Lamp Company. The attorneys came to an agreement and the motion was not opposed. Judge Shipman granted an order dismissing the bill.

President Whitney Remembers the Faithful.

President Whitney, of the West End Street Railway Company, Boston, has notified the families of the four employés who lost their lives while trying to save the company's property in the recent fire at Everett that, in addition to paying the funeral expenses of the deceased, the company will give each family $1,000.

An Early Comparison Between Steam Power and Electro-Magnetic Power.

The following is a literal but abridged translation of an article which appeared in a scientific weekly magazine called *Algemeene Konst and Letterbode*, published in Haarlem, Holland, March 15, 1846:

If we compare steam power and electro-magnetic power in regard to their mutual similarities and differences we arrive at remarkable conclusions, worthy of being brought to the attention of all those who at present, with the most intense expectations, watch the results attained by numerous practical investigators.

Commencing with the fundamental principle, the moving force, we find that there is a similarity in both cases, namely, that the results of chemical combinations lay at the basis of both; that for the production of steam power, fuel is required, while for the production of electro-magnetic power an easily oxidizable (combustible) metal is necessary. The fuel combines with the atmospheric oxygen, the metal with the oxygen in the liquid of the battery; the first combination begets heat; the other generates an electric current. By the heat of combustion, water is changed into steam having an intense expansive power, while by the electric current, iron obtains a magnetic attractive capacity. The expansion of steam moves the piston of an engine, while the magnetic attraction of the iron operates the electro-magnetic motor.

Both systems may be made to operate alternately with a to and fro movement, which, acting upon cranks, produces rotation, or both systems may be made to act directly upon a rotating device. The first has been found best for steam engines, while the second is usually adopted for the electro-magnetic motors.

In order to conclude the series of similarities it must be stated that, in the same way as in the steam engine, there is a relation between the amount of fuel consumed in the furnace and the power produced; so in the electro-magnetic motor, there is a relation between the amount of metal oxidized by the acid in the battery and the electro-magnetic power obtained.

In order to give a clear *exposé* of the above comparisons we may construct the following table:

Steam Power.	Electro-Magnetic Power.
Combustion.—Combination of the fuel with the oxygen of the atmosphere.	*Oxidation.*—Combination of the metal with the acid in the battery.
Product.	Product.
Heat.—The heat gives expansive force to water, forming steam. The steam, by its expansive force, acts upon movable parts, producing motion.	*Electric Currents.*—The currents act by the intervention of copper coils upon iron. The iron by the magnetic attraction thus generated, acts upon movable parts, producing motion.
The Generation of Steam may also produce electricity, as practically proven by the electricity generating steam boiler of Armstrong in 1843.	The Generation of Electric Currents may also develop heat in the wires conducting the currents, as practically proven by melting refractory metals.

The above comparisons lead us to point out the advantages of electric power over steam power. They are:

1. The transmission of steam can only be effected in strong, hermetically sealed metallic tubes, while for the transmission of electric currents merely metallic wires are sufficient.

2. By the wire transmission of electric currents the distance is of far less account than when using tubes for steam transmission, by which the steam soon loses much of its heat, and consequently much of its pressure, becoming unreliable, while the water of condensation collecting in the tubes becomes a drawback, and even a nuisance.

3. Steam tubes, when of great length, are very unreliable, being very apt to become leaky by reason of the continual expansion and contraction produced by the alternate heating and cooling, while an electric wire, if properly arranged, is always reliable. In proof of this we may point to the wires of the electric telegraph, which in a few years has been successfully introduced, and promises to become universally adopted for greater and greater distances.

4. It is far less expensive to insulate an electric wire against loss of current than to cover a steam pipe against loss of heat, and consequent loss of pressure.

5. As the air is a non-conductor of electricity it will preserve the electricity in a bare wire, which only needs insulation at the points where it has to be supported, while the air being no insulator for heat, steam pipes have to be carefully protected over their whole length, which means an expensive covering with materials which do not conduct heat.

6. An electric wire can much more conveniently be connected with any part of a building, say the top floor, than is the case with steam pipes, which may be objectionable in the localities to be passed through where they are not needed, while a wire practically takes no place and may be inserted in the wall, or made to run outside the building.

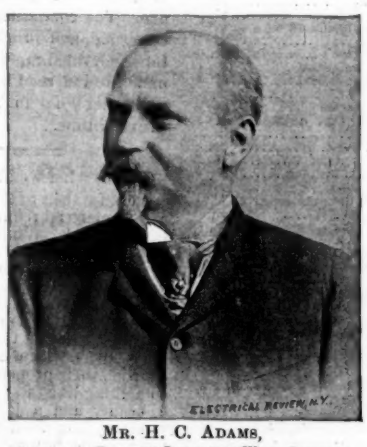
7. Any addition or any changes in an electric conductor will be effected with small labor and expense, also with little delay, while additions and changes in steam pipes always require much labor, cost and usually a very inconvenient and long delay.

8. Electric motors are, by the nature of their construction, much simpler, more compact and less expensive than an equivalent steam engine. However, I do not agree with what some have asserted lately, that nearly every plain blacksmith can make an electro-magnetic motor. That may be so to some extent for toy motors, but when a motor is required for practical purposes, such as to turn a lathe, it becomes a matter of a great deal of study and care in execution. I state this in consequence of may personal experience.

Superficial considerations, such as the above, are very apt to foster our highest expectations that electro-magnetism is to be the moving force of the future.

But let us now consider the other side and examine how the power of the electric currents of to-day compares with that of steam.

We find in steam a power of such enormous capacity that it has been found necessary to invent all kinds of ingenious devices to bridle it, and to obtain useful results in place of destructive ones. In electricity we see a very weak power, to which, on the contrary, it is necessary to apply all possible means to strengthen it, so that after deducting losses by friction, etc., there may be left any practically useful effectiveness. We see this from the first discovery of each of these two forces, from the Æolipile of Heron, which ejected steam with great violence, and Œrsted, who only deviated an easily movable compass needle from the magnetic meridian. When we follow this history of the applications of these first discoveries, we find very powerful effects in the first steam engines, notwithstanding their defective construction, while to the contrary, Jacobi, in 1839, on the river Neva, in Petersburg, propelled a boat with a velocity far inferior to that with which a horse moves any of our heavier loaded canal boats, which are in fact celebrated for their slow way of moving, being on the average not more than three miles an hour, as the person in charge of the horse walks next to it. This result was obtained, notwithstanding Jacobi used a battery of 320 large cells, its current acting upon an electro-magnetic motor constructed with the utmost care upon the, at that time, best known principles.



Mr. H. C. Adams,
President Phillips Insulated Wire Company.

We see, in fact, on one side an enormous power, and on the other side a feeble attraction and repulsion, which, when making it move with very great rapidity, and reducing this in order to obtain more efficient tractive force, is always in comparison with steam exceedingly weak.

The power of our at present available electric currents is so weak indeed that it has been said that it can be entrusted to the management of a child. If we ever succeed in increasing these currents so as to give results as powerful as steam, they may become dangerous in their direct effect upon the human body; however, the most dangerous feature of steam power will be at an end—no more boiler explosions.

As the large batteries, such as Jacobi used, are so very expensive in regard to material and maintenance as to be beyond reasonable limits, it will be impossible for electro-magnetic motors to compete, and much less to supersede the steam engine. In order to accomplish this we must first be able to generate cheaply, sufficiently strong electric currents, so as to make electro-magnetic motors capable of being advantageously used for practical economic purposes.

Finally, electro-magnetism can, according to our present condition of knowledge, by no means be considered as adapted to supersede steam entirely; for this purpose the application of an absolutely new and thus far unknown principle is necessary.

P. H. Van der Weyde.

Zieriksee, Feb. 5, 1844.

The "absolutely new and, therefore, unknown principle" referred to at the close of the above article, written nearly 50 years ago, remained for 20 years longer like an unfulfilled prophecy, until between 1862 and 1872 the function of the then well-known and improved electro-motor was invented, and in place of using it as a machine to produce motive power by means of passing electric currents through the revolving parts, the revolving parts were rotated by means of any power at disposal, either horse power, steam power or hydraulic power.

By this conversion the admirable machine was at last obtained, which at first was called the "dynamic electro-magnetic machine," and soon afterward simply the "dynamo." It was the remarkable product of the evolution of human ingenuity practically applied, being first started by Pacinotti and Gramme. It was further improved in various details by Kravogl, Pfaunder, Hofner Alteneck, Siemens and others, and this during the period between 1862 and 1872. Since that time, still more improvements in detail, and especially great variety of designs, have been brought forward and put very successfully in practical operation, of which there are two which differ considerably from the first dynamos constructed, namely, the Brush, and still more the Thomson-Houston dynamos. They all give the strong electric currents which were needed, and fulfill the wants for cheap power and illumination.

It is evident that as any electric current will drive a motor, the current thus obtained from an inverted motor may drive other motors.

The fact is that originally (30 years ago), the invention or discovery was made that an electric motor could be inverted into a generator of electric currents. As more than 60 years ago it was well known that such currents were capable of electric motors, it is not according to the chronology of the successive electric discoveries, to speak of the conversion of the dynamo into an electric motor, because such motors will revolve with any suitable electric current either produced by galvanic batteries or by dynamos.

P. H. Van der Weyde.
New York, Dec. 31, 1892.

The New President of the Phillips Insulated Wire Company.

The Phillips Insulated Wire Company, of Pawtucket, R. I., will hereafter have its headquarters at 39 and 41 Cortlandt street, New York, which will be occupied by the new president, Mr. H. C. Adams, and his staff. This company will manufacture all kinds of insulated wire such as triple braided weather proof, damp proof, office wire, etc., and has adopted as its trade-mark "O. K." letters standing out in white colors on a black background.

Mr. Adams, the president of the company, is quite widely known in electrical circles. For the past few years he has been the Eastern manager of the Fort Wayne Company, and prior to that time was connected with the American Electric Light Company. But Mr. Adams is more widely known as an electric wire man than in any other capacity. In 1867, twenty-five years ago, he first entered the electric wire business, becoming at that time connected with that pioneer and now most widely known and successful house, Messrs. Holmes, Booth & Haydens. This long experience in the electric wire business will make Mr. Adams and his company very strong factors in the industry in this country.

The New York Safety Steam Power Company have just shipped a 50 horse-power high speed engine to the Tojo Mining Company, Mazatlan, Mexico, for driving a dynamo for mine lighting.

TELEPHONE CHAT.

The telephone service at Key West, Fla., is to be improved.

The telephone service of Galveston, Tex., is being improved.

Opelousas and Washington, La., will be connected by telephone.

A new 50 drop switchboard has been installed at the Urbana, Ill., exchange.

Manager Goddard, of the Haverhill, Mass., exchange, moved his plant into new and better quarters on Christmas day.

The Southern New England Telephone Company will replace all Blake instruments in Bridgeport, Conn., with long distance sets.

The telephone line from Versailles to Linn Creek, Mo., is nearing completion; and a line is talked of between Galena and Cape Purvis.

The new copper circuit for the New England Telephone and Telegraph Company, between Boston and Portland, is finished.

The New England Telephone Company has just completed a metallic circuit between Fair Haven and Rutland, Vt., by the way of Castleton.

The Nebraska Telephone Company offers to place Grand Island, Neb., on the Omaha-Lincoln circuit for a guaranty of $1,500 to cover tolls for two years.

The directors of the Hudson River Telephone Company have announced that they will give a long distance telephone concert and reception in the new telephone exchange at Albany shortly after the holidays.

The new telephone line being constructed between Dallas and Fort Worth, Tex., by the Southwestern Telephone and Telegraph Company has been completed from Fort Worth to Arlington, and work is being pushed.

A new telephone line, 450 miles long, from Spokane, Wash., to Portland, Ore., will be completed early next summer at a cost of over $100,000. Work on it was begun last June, but has been discontinued owing to the bad weather.

The telephone has appeared at Roumania, but it is not yet a success, because of an official order that, when a person desires to telephone to another city he must arrange with his correspondent to be at the instrument at a fixed hour and minute. The rule is said to be rigidly enforced.—*Philadelphia Ledger.*

One of the favorite investment stocks of St. Louisans is the Missouri Bell Telephone stock. There is only $400,000 of this stock, and the company have not as yet issued a dollar's worth of bonds. They pay 12 per cent. dividends per annum. Whenever any of the stock comes on the market, through the selling of an estate or otherwise, it is eagerly snapped up by the brokers. The last quotations on this stock were $188 @192.

The American Bell Telephone Company closes the fiscal year with a good instrument statement, as see the following:

Month Dec. 20.	1892.	1891.	Increase.
Shipments	6,770	5,095	1,675
Returned	4,056	3,522	534
Net output	2,714	1,573	1,141
Since Dec. 20	1891-92	1890-91	
Shipments	93,579	69,452	24,127
Returned	54,247	42,762	11,485
Net output	39,332	26,690	12,642
Instruments in use Dec. 20	550,442	508,416	42,026

Public Opinion, the eclectic weekly, of Washington, D. C., which has made a feature of offering liberal cash prizes for the best essays on prominent topics, has just announced three cash prizes of $150, $100, and $50, respectively, for the best three essays upon the question, "What, if any, changes in the present immigration laws are expedient?" The contest is open to any one and full particulars may be had by addressing *Public Opinion*, Washington, D. C.

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THE OPINION OF AN AUTHORITY:

"The editorials appearing in ELECTRICAL REVIEW have been of untold value to all electrical enterprises."

A. M. YOUNG.

A discussion is in progress as to whether English or French is the most economical language to use in conversing over the London-Paris telephone line. Whichever way the matter is decided, a woman will always get more talk for her money than a man.

The Sawyer-Man and the Westinghouse Companies have been restrained by the courts from making incandescent lamps in infringement of Edison's patent, but at the same time the consumer has been protected to a certain extent. It is understood that as many as 20 injunctions against lamp manufacturers will be prayed for during the present week by the Edison Electric Light Company and the Edison General Electric Company.

A sigh of relief will escape from the hard-working electrician and ascend toward the cerulean, as he realizes that the holidays are over—until the next time.

The ELECTRICAL REVIEW extends to every one who reads this the assurances of its distinguished consideration and wishes for a Happy New Year. Now is the time to subscribe!

Our old friend Pennock, the primary battery man, is evidently endeavoring to educate the Bostonians up to a proper appreciation of the primary cell, as we have received several marked copies of Boston papers containing articles on the old subject.

It may be a scandalously daring suggestion, which is advanced by a western paper, but it is none the less true that churches would be more popular and much more comfortable if they were ventilated as carefully as are all stylish liquor saloons and high grade restaurants. Steam heat, and not too much of it, in winter, and electric fans in summer may seem somewhat radical, but the time is coming when churches will be equipped with these comforts.

The rapid transit franchise for an underground road in New York City was offered for sale by the rapid transit commissioners last week. The sum of $500 and one-half of one per cent. of the gross earnings of the road were offered as one bid with an alternate bid of $1,000 cash with no percentage. The commissioners refused to accept either bid, and propose now to devise plans for an elevated rapid transit railway. The underground road must eventually be built, no matter what makeshift may be used in the meantime.

This is what we like to read:

Rapid transit to the (now) suburbs means a very material reduction of rents in the city of Hartford. When opposition is brought to bear against the companies on their applying for a charter, the property owners who are directly concerned in the renting of tenements will be the strongest opponents of reform. Of course, their direct opposition won't be that the proposed electric railway deprives them of reaping 12 and 15 per cent. on their property. Oh! no; it will be something like this: "Hartford's streets are a beauty and a joy to our eyes (in dry weather), and we dislike to see our beauteous town made hideous by the awful electric poles," etc. But it won't work; we must have some more speedy mode of getting from place to place than the antideluvian horse car inflicted upon us for so long a time. The *Post* is the champion of this thing, and don't let the *Post* "go it alone."—*Hartford, Conn., Post.*

This is the true tone of progress which the daily press is bound to give voice to in the course of time.

In modern Athens a patrician chariot came into collision with a Jove-propelled vehicle used to cater to the convenience of the *hoi polloi*, and designated by them as a "trolley car." An ancient Greek, who signs himself "* * * *," thus describes the accident in an epistle to the Boston *Transcript:*

"The car kept on its way, passing so closely, the coachman states, that he followed a perfectly natural instinct and turned his horse away toward the curbstone. The added length of the radius of the wheel, through the turning of the forward pair on the pivotal king-bolt, caused it to be cramped by the car. The car supported the toppling carriage until it had passed, and then, the support withdrawn, the occupants were dumped into the roadway in its wake."

This passage from the classic prose poem should be soul-satisfying to the residents of Beacon Hill and the devotees of the literary shrine at the Papyrus Club. But our modern Greek tragedian lets his fervor get the better of his practical judgment. Does not this passage lose a little of its dramatic effect when we remind our Athenian friend that a trolley car is supposed to follow an iron track, while a private chariot may use the whole roadway, if necessary? Prithee, O Greek, why did not your charioteer turn aside in time?

LOOKING FORWARD.

To prophets of experience the outlook for 1893 in the electrical field seems to be rather encouraging, although here and there dark places may be discovered, even as we step forth into the dawn of a new year. If we can with even a slight degree of certainty look far enough ahead to judge the weak places, or where they are likely to be, we have discounted the situation considerably, and are that much in advance of others.

In this country we shall have a much quieter year than last, politically speaking. We have selected another chief executive, and business will not feel the effects of a Presidential election for another four years. National elections are a great distraction, and always leave their mark upon the industrial machinery of a country. Europe is pretty badly stirred up just at present. Seizing the Panama scandals as a pretext, it seems as though the volatile and uneasy spirit of the French, as represented in certain political parties, may possibly lead to trouble. Berlin is keeping a close eye upon Paris, and England and Russia are still at their old game of chess in the far East. Crises abroad have a limited effect upon us, but not such as to seriously interfere with commerce or general business. We must, nevertheless, keep posted upon the trend of the times among our foreign brethren.

It seems pretty certain that we may expect an outbreak of cholera in the spring. It will, doubtless, make its first appearance in New York, some other of the large seacoast cities or in one of the cities on the Great Lakes. An epidemic is a dreadful catastrophe, and nothing so effectually blocks business as the breaking out of such a scourge as cholera. We must be forearmed in this matter, and every citizen should see to it that he performs his little part in the general defense against an invasion of disease.

The World's Fair will probably have little or no effect upon the electrical business. It will be an advertisement of electrical apparatus, which will do us good with the general public in the future. Its immediate effect should be beneficial rather than otherwise.

Those enthusiasts who look for "free telephones" during the coming year will be vastly disappointed. The Chicago-St. Louis electric railway is still on paper and, if we travel by electric power at 100 miles an hour from St. Louis to the World's Fair, some very lively financiering and construction work must be done by Dr. Wellington Adams and his associates.

The watchword of electrical workers is "Progress," and it is certain to be vindicated during each succeeding year. The opportunities for advancement in the electrical world are immense and will be accepted "as fast as we can get round to them."

Postmaster-General Wanamaker, in his last annual report, urges, for the fourth time, the consideration of a postal telegraph and telephone system. His arguments are lengthy and exhaustive, and reach a climax in these words:

"A postal telegraph and telephone service, the postal savings depositaries, pneumatic tubes, or some electrical device, to connect city sub-stations and main offices, ferries and railroad stations, with central offices in all large cities, should not wait much longer."

There are many arguments *pro* and *con* to be advanced, and Mr. Wanamaker evidently believes in the policy of keeping the matter alive by constant stirring up.

Where can you point to an industry which is so well represented, journalistically, as the electrical industry? The number and quality of the newspapers devoted to electrical and allied interests is far above the average, and every electrical worker should be proud to know that his profession is represented by such live and enterprising newspapers as the ELECTRICAL REVIEW, *Electrical World, Electrical Engineer* and *Western Electrician.*

CORRESPONDENCE.

OUR CHICAGO LETTER.

The Detroit Electrical Works, Detroit, Mich., are supplying their patrons with a very neat and artistic calendar for the new year.

George Cutter is smiling at the stormy weather, as his lamp-supporting pulleys sell all the better when they are clogged with snow and sleet.

Mr. A. M. Walter, formerly of the Illinois Electric Material Company, and now with the General Electric Company, at Lynn, is spending the holidays in Chicago.

Electricity is Playing a great part in attracting crowds in the stores on State street. Many devices are used, such as turning different colors on and off, the spelling of words and the use of miniature lamps.

W. Foreman Collins, for the past three years western representative for the *Electrical Engineer*, has resigned to accept a more lucrative position as business manager of the *Western Electrician*. Mr. Collins has many friends West who wish him all success possible in his new position.

D. H. Ogden, western representative of the *Electrical World*, suffered a severe fall while on the street Saturday last, resulting in a colees fracture of the wrist bones. While very painful the fracture is not serious, and Mr. Ogden is again able to attend to business, but it will be some time before he will have the use of the injured arm again.

The Warehouse Recently leased by the General Electric Company for a term of ten years, at a rental of $100,000, has been sold to Gen. Milo S. Hascall for a consideration of $120,000. This property is located on Johnson street, alongside the Wisconsin Central Railroad tracks. The building was completed some six months ago, and consists of six stories and basement, 144x100 feet, covering a lot of the same size.

The Central Electric Company since having taken the agency of the Interior Conduit and Insulation Company's products have, on account of the large demand for these goods, found it necessary to open a separate department in order to be better able to supply the trade. In addition to the complete stock of line tubing, branch and junction boxes which they are now carrying in stock, they will also put in a complete line of Lundell power and fan motors, which met with so much success upon the market the past season. Mr. H. H. Small, formerly with the Thomson-Houston Company, and recently with the General Electric Company, has been secured as manager for this department, which this coming year will be energetically pushed forward, and the Central Electric Company expect to secure good returns. M. J. B.

Chicago, December 31.

OUR BOSTON LETTER.

The Mather Electric Company have put two of their 600-light machines into the works of the Hathaway Cotton Mills, of New Bedford, Mass.

An Interesting Paper on "Heating and Washing of Metals by Electricity," was read recently before the Society of Arts, at the Institute of Technology, by Mr. Geo. D. Burton, president of the Electrical Forging Company, of this city.

The Boston Gear Works, of 38 Hartford street, Boston, Mass., are doing a flourishing business in their line in the electrical trades, their noiseless fibroid gears being especially adapted to high speed work. Aside from the large stock of standard sizes in both iron and brass, they make gears to order of all sizes up to seven feet in diameter. One of their leading specialties is small brass gears used extensively by electricians.

The Massachusetts Chemical Company are meeting with the most encouraging results everywhere from their now well known "Insullac," and are daily in receipt of complimentary letters from all parts of the country. Among the strongest of these recently received are letters from the West End Street Railway Company and the W. S. Hill Electric Company, of this city, and the Consolidated Street Railway Company, of Grand Rapids, Mich.

The West End Street Railway Company have shown their appreciation of the loyalty and bravery of the four men who lost their lives in endeavoring to save the company's property at the time of the disastrous fire at Everett by the gift of $1,000 to the families of each of the unfortunates, besides assuming all the burial expenses. It is by such substantial testimonials as this that the kindly relations between employés and employer are strengthened and the unity of their interests made apparent.

The Incandescent Lamp situation continues to be the principal topic of discussion in this section, not only among those directly interested, but throughout the entire electrical trade. Rumors of all kinds fill the air, but no two men seem to agree as to what the probable outcome will be. While there is undoubtedly a feeling of considerable anxiety among the manufacturers as to the action of the General Electric Company, there is still a wide diversity of opinion as to the power granted by the injunction, and the majority are inclined to take matters philosophically and make the best of the situation, at the same time expressing a determination to die, if die they must, "with their boots on."

The Simplex Electric Company, of this city, have just come into possession of a phenomenon in the shape of a section of their wire which, by the natural growth of a tree, had become deeply imbeded in one of its branches, forming virtually a part of the tree itself, and under these conditions continuing to carry a heavy current without interference to the service or damage to the wood. The wire in question is the regular No. 10 "T. R. Z.," manufactured by the Simplex Company, and was in use on an electric light circuit in one of the suburbs of Boston at the time it was discovered. An inspector going over the line noticed that the wire lay very close to one of the branches, and sent a man up to put in an insulator. It was then discovered that the wire which, when originally strung had rested in a crotch of one of the branches, had been completely grown over and imbeded by the growth of the tree, and was now in the center of about three inches of wood and clamped as though in a vise. The insulation, though squeezed flat, was as perfect as when the wire was first strung, and that, together with the fact that it had resisted the swaying of the branch during all this time, speaks well for its strength and durability. The limb containing the section of wire was cut off, and the company will preserve it as a specimen of nature's advertising. H. G. T.

Boston, December 31.

OUR LONDON LETTER.

Last Week we had a well attended conversazione at the Kensington Town Hall, where Lord and Lady Chelmsford received the guests; and the most interesting part of the entertainment consisted of electrical demonstrations supplied by Messrs. Faraday & Son and Messrs. Crompton & Company, who attended by invitation. The first named firm exhibited a series of artistic fittings, including many of the new devices for regulating excessive brilliancy, while Messrs. Crompton showed how easily and expeditiously heating and cooking may be accomplished where the mains for electric lighting are available. Such exhibitions can hardly fail in time to produce good fruit.

This is by no Means a busy time here. Our shops are dressed up attractively for Christmas, but the customers do not appear in any remarkable number, and the principal subject of public interest is what are we to do with the "unemployed." Still every succeeding week some new electrical installations appear, though to note them in detail would clearly serve no useful purpose. The lighting of the streets, however, which has been effected since my last letter, seems to deserve more particular mention. A few weeks ago the London Electric Lighting Company contracted for the erection of 515 arc lamps in the chief metropolitan thoroughfares. Almost all these are now supplied, and showed well and advantageously during the recent fogs; and the company are now proceeding forthwith to set up incandescent lamps along the smaller streets. We are thus decidedly progressing.

In the Other Departments of electrical development we have done little during the last month, and in one our progress is likely, for a while, to be still further retarded by an untoward accident that occurred in the north of London, last Monday evening, upon one of our two electrical tramways. As a tramcar on the cable line was ascending Highgate Hill, the gripper lost hold of the cable, and the car ran backward down the hill with constantly increasing velocity. On reaching the end of the line it dashed into a "dummy" car that was standing there and totally wrecked it. The shock knocked a car that was stationary behind the dummy off the line, and this ran down Holloway Hill for about 200 yards, finally coming to a standstill in the center of the thoroughfare, near the end of Elthorne Road. Great alarm was caused, as the streets were crowded at the time, but, fortunately, no one was hurt. The Board of Trade have given notice that the license to run the cable tramway will not extend beyond the present month without a further careful inspection.

The Communication of lighthouses and lightships with the coast steadily approaches completion; and very properly, earliest attention is being given to those points of the coast where wrecks most frequently occur. Among the most prominent of these is doubtless the southwestern extremity of Cornwall where so large a number of vessels pass in entering the English Channel. All the islands of Scilly, grouped thereabout, Fresco, Boyer, St. Martin's, St. Mary's and St. Agnes' are now connected with the Coast Guard Station at Pothlean and with the Lizard Signal Station, and then, further on, with Cadzwith Post Office and Cadzwith Coast Guard. It is expected that very shortly all the lighthouses and lightships around the coast will be connected with one or other of the various circuits. The Royal Commission has received a valuable accession in the person of Mr. W. H. Preece, whom the Queen, by warrant under Royal Sign Manual, dated November 26, appointed a member of the commission in the place of Mr. Edward Graves, deceased. The first report of the commission was considered on Thursday, the 8th inst.

I Begin to Apprehend that the dense and foggy atmosphere of this great metropolis is unfavorable to that clear, energetic condition of mind which is desirable in scientific speculations. We speculate readily—too readily in money—not a few risking their all for the vague chance of a tempting monetary gain. But there is little consideration for those useful discoveries and inventions of science of which our neighbors avail themselves readily and with very great profit. Thus, for instance, respecting the electric trams, of which I have just written, we find them flourishing in Leeds, Birmingham, Stafford, Plymouth, and, beyond our borders, in Paris, Marseilles, Berlin, Vienna, etc.; while here our first little attempt results in a disastrous breakdown. It is the same want of spirit that leaves our electricians unable to make a suitable appearance at Chicago. For the telephone, that wondrous device which, without the expense and trouble of traveling, brings the dwellers in distant lands to be "on speaking terms," perhaps I should hardly care to mention it in a letter addressed to New York, where, by all accounts, the telephone has simply been brought to perfection. FFRENCH.

London, December 10.

PERSONAL.

Nikola Tesla has been made a member of the Royal Institution.

H. N. Galpin, a director in the Berlin Iron Bridge Company, died at Berlin, Conn., on December 22, aged 76 years.

Dr. W. Leigh Burton, the inventor of the Burton electric heater and a well known dentist, died recently at his home in Richmond, Va.

Abijah L. Shattuck, a prominent citizen and treasurer of the Orange, Mass., Electric Light Company, died recently at his home in Orange.

Mr. Charles P. Geddes has been elected secretary and treasurer of the Interior Conduit and Insulation Company, of New York, in place of Mr. F. A. Mason, resigned.

George Franklin Jones, associate editor of the *Telegraphic Age*, is dead. He was formerly Supreme President of the Order of Commercial Telegraphers, and was at one time head telegraph operator in the New York Stock Exchange.

Capt. W. L. Candee, American managing director of the International Okonite Company, Limited, sailed for England last Saturday. He goes on business for the Okonite Company, and will visit the London and Manchester branches of the concern.

Senor Aurelio Arango, the treasurer of the Spanish-American Electric Light Company, of 44 Broad street, this city, while on his way to business on December 22 was taken sick in an elevated railroad car. At Chambers Street Hospital he died of heart failure.

George F. Jones, an old-time telegrapher, died at Smith & McNell's Hotel, in Greenwich street, at 9 o'clock in the evening of December 25. He was a man of unusual intelligence, and was one of the foremost in promoting the best interests of the telegraphic fraternity.

Mr. J. Frank Dillont, formerly business manager of the *Electrical World*, has been appointed manager of the New York branch of the Massachusetts Chemical Company, with offices at 60 and 62 Broadway. This is the company which makes the new insulating medium "insullac."

G. Hellebruck, at present assistant in Mr. Knight's office in the railway department of the Thomson-Houston Electric Company, at Lynn, Mass., has accepted the position of master mechanic with the General Electric Company, at Brussels, Belgium. He will leave America for Europe early this month. He will be succeeded by Mr. Wiley.

LETTERS FROM A LABORATORY.—XXVIII.

BY JULIAN A. MOSES.

Electricity and photography are what we might call twin sciences; their ages, counting from the period of the beginning of their development, are about the same. Both have their foundations on the science of chemistry, and it is not at all surprising that there should be a mutual assistance, and a consequent merging of the sciences and processes into one. The progress of electricity has been aided to a considerable extent by the assistance that has been afforded it by valuable photographic processes, that have grown with almost the same rapidity as have the numerous applications of electricity. The beautiful reproductions seen in the journals of to-day would not be in existence were it not for photography. The old, though artistic, wood cut and steel engraving would be the resource of the illustrator, and the expense of conducting magazines such as we have now would be so great as to prevent their publication. But there is such a thing as photography, and the processes now in existence are in such a state of progressive perfection that in a short while it will be an old fashioned laboratory that is not provided with a dark room. The camera is almost as essential to the experimenter as the pencil is to the artist. In this decade complete records could not be kept without drawings and photographs, and those who wish to maintain their accuracy and standard must resort to this latter, more perfect, scientific and facile means. When a perfect and necessary process exists, and the expense of maintaining it is inconsiderable, there can be no reason for not using it to the best advantage.

There is nothing to be gained by the experimenter hampering himself with imperfect apparatus. Ruskin once said: "Give me some mud off a city crossing, some ochre out of a gravel pit, and I will paint you a luminous picture, if you give me time to gradate my mud and subdue my dust; but, though you had the red of the ruby, the blue of the gentian, snow for the light and amber for the gold, you cannot paint a luminous picture if you keep the masses of those colors unbroken in purity and unvarying in depth." This sentence has often been quoted to illustrate the well known saying: "It is the poor workman that always complains of his tools." These metaphors must be allowed a great degree of latitude in order to make them fit all cases. No one knows better than the experimenter that, if he had bad tools, and if he continued using them, the work turned out by him would be of a quality on a par with that of his tools and apparatus. Just suppose, for instance, that his home-made resistance coils did not record the accurate respective resistances; what would his work amount to when finished? Those who defend the above quotations might say: "Let him repair his resistance coils, and then he will have better work as his reward." Some will defend the use of primitive apparatus, and claim that just as good, if not better, work can be done with it. These objections have really been made, and to the objectors I have answered: It is not expensive apparatus that is needed, but apparatus that is efficient and well constructed, and then it follows, as a matter of course, that such apparatus will be more costly. Experience, dearly bought experience, has told hundreds of experimenters that, in the end, it is the standard and costly pieces of apparatus out of which they have derived the most use. I do not mean that more inventions and discoveries have been made by employing them. Far from it! The inventive ability necessary to be able to utilize waste pieces of apparatus, etc., has aided the economical inventor considerably, and the man who has made many inventions has generally been hampered in his work from the outset.

But in the process of photography, solid, well made and standard apparatus, made by reliable firms, is of primary importance where good work is required. A safe rule, therefore, in buying photographic materials is, purchase the best from the beginning, and you will never have cause to regret, as many have before you.

ELECTRIC RAILWAY AND POWER NOTES.

Shelbyville, Ind., is to have an electric road.

Paterson, Hoboken and Jersey City, N. J., will be connected by a trolley road.

Surveys of the proposed electric street railway between Rockville and Ellington, Conn., are being made.

The project to build an electric railroad from Kingston to Lake Katrine, N. Y., is very favorably considered.

Work on the St. Louis and Clayton Electric Railway is progressing rapidly. About one mile of the roadbed is ready for the rails.

The electric street railway power house, at Windsor, Ont., was burned on December 26, with heavy loss. The amount of insurance is unknown.

The first distribution of the capital stock of the Niagara Falls Power Company to the subscribers to the construction fund will be made early this month.

The options which were secured several days ago on the Reading, Pa., and Southwestern and East Reading electric railways by a syndicate of capitalists have expired.

Notices for the two electric railroads, from Auburn to Turner and from Auburn to Mechanic Falls, Me., were published recently, and the legislature will be asked for charters this winter.

At a recent meeting of the Oakland, Cal., board of supervisors a franchise was granted giving the Oakland, Piedmont and Alameda Railway Company permission to change its line to Alameda into an electric system.

The electric cars of Boston are soon to be warmed by electricity. Now, if the music of the symphony concerts could be conveyed by telephone to the cars, Bostonians would be perfectly comfortable.—*Springfield, Mass., Union.*

The street car barns and electric plant of the Villard line at Milwaukee were totally destroyed by fire on December 28. The fire was caused by a bomb being thrown into the main building. The loss will reach $160,000.

Two electric stamping machines have arrived at the Kansas City, Mo., post office and will be put up ready for work as soon as the expert arrives who is to put them together. These machines each have a capacity of 25,000 letters an hour.

A project is on foot to run an electric railway from Middleburg, Pa., by way of Mifflinburg or New Berlin, through Lewisburg to Milton and Watsontown, and at no distant day connecting at Muncy with a road running east from Williamsport.

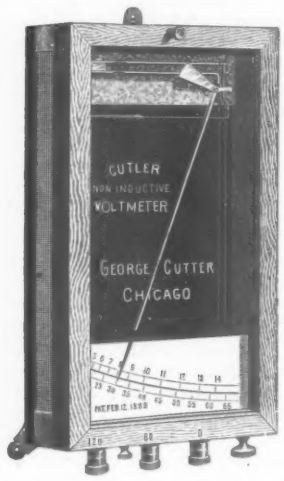
The projected trolley railway from Newtown to Bristol, Pa., has met with such favor that another line is already talked of. This is to be from Newtown to Trenton, passing through Morrisville and Langhorn, and traversing a fine and thickly settled portion of the country.

The trials of the Compagnie des Tramways, at Paris, with electric cars seem to have proved very satisfactory. The company has adopted accumulators of the Laurent-Cely-Sarcia system. The new cars have seats for 56 passengers, with roof seats. They have independent truck bodies, and each axle is fitted with a 15 horse-power motor. The cars, which can be run together in trains, run at eight miles an hour in Paris and 10 miles outside the fortifications. Each car is furnished with a special apparatus to derail the cars, so as not to interrupt the traffic when the road is obstructed by accident. A powerful electric brake enables the car, by reversing the current, to be stopped within three yards.

Superintendent C. R. Howard, of the Schuylkill Electric Railway Company, has had a number of "dead locks" placed along the road on the cemetery grade, between the Fourteenth street turnout and Twelfth street, in order to prevent the cars from running away in the future. The locks are made of huge billets of wood attached to heavy chains stapled fast to a post sunk in the road-bed on the inner side of the rail. At times when the rails are slippery a man is stationed at the locks, and if he sees that a car has broken loose from the control of the motorneer, he will place the billets upon the rail in front of the car, and lash them fast by means of the chains. These obstructions will stop a car, no matter what its speed may be. Mr. Howard is making arrangements to have a series of soft charcoal iron brakes attached to the cars, to operate independently of the other brakes. These brakes, when applied, become heated, and gald to the rails, proving very effective in stopping a car.—*Pottsville, Pa., Chronicle.*

The Cutler Non-Inductive Voltmeter.

A few weeks ago we illustrated the hot-wire ammeter devised by Mr. H. H. Cutler for use on either direct or alternating currents. The principles underlie the non-inductive voltmeter which is shown in our cut and which is being used with good



THE CUTLER NON-INDUCTIVE VOLTMETER.

results at a number of places. The two expansion wires (one of which does the measuring while the other compensates for the changes in the temperature of the room) are made of a special alloy which is not affected by the atmosphere and hence remains perfectly constant. The resistance in series with the measuring wire is at the back of the instrument, while the binding posts are placed along the lower edge and have a protecting cover of hard rubber. This voltmeter has no magnets, no coils and no particle of iron; hence it is entirely unaffected by the strong magnets or large masses of iron which are always found in central stations. Another remarkable point about this instrument lies in its being absolutely dead-beat. Many voltmeters leave the pointer free to move beyond the proper mark, so that its momentum will carry it past the point corresponding to the pressure, and it then swings back and forth for a little while. In the Cutler non-inductive voltmeter the pointer can only move as far as the expansion of the wire will permit, so that there is none of the annoying see-saw motion due to the momentum of the coils and armatures as found in other instruments. The needle merely swings over to the mark and stops there, making it possible to take series of readings much more quickly than with any other instrument.

These voltmeters are made with either a single or a double scale, and are calibrated to meet various requirements from two and a half volts for storage battery tests to 800 volts for street railway work. They are licensed under the Cardew hot-wire patent and are being introduced by George Cutter, of Chicago.

The Passing of the Street Car Horse.

[From the Indianapolis *Journal.*]

The subtle fluid by B. Franklin tamed
Has lost the street-car nags their oncewhile places;
And now we find them (though they can't be blamed)
A-trotting heats in various winter races.

THE TRAIN DISPATCHER.

AN IMPORTANT OFFICIAL IN THE RAILROAD BUSINESS.

The train dispatcher is a peculiarly constituted individual. He must be a good telegrapher and a man cool and calculating. He must know the second dots on the dial of a clock as well as he does his oldest child, and be able to work out the most troublesome mathematical problems mentally, says the Baltimore *Herald.* The work must be done rapidly and well, for the least mistake in calculating is liable to send two trains crashing together and a dozen souls into eternity, cause delays that cost thousands of dollars, or smash to smithereens thousands of dollars' worth of freight. He must know at every minute in the day just exactly where every train on his division is, and every failure to know places him in momentary danger of being the means of destroying property and crushing the lives out of human beings. Should he become absent-minded, as most people do, and tell a conductor he had 30 minutes to make a given point before the fast mail arrived there, when he really meant that there was only 25, the trains would come together before the misinformed conductor's train reached the point. A collision would certainly ensue.

The manner in which the train dispatcher keeps track of the trains on the division over which he has charge is simple when thoroughly understood. There is little machinery and less formality, and the burden of the business is carried in the dispatcher's head. The average citizen would not accept such a position for a salary of $1,000 a month. Yet the salaries of train dispatchers range from $75 to $175 per month, with the average close around $100, and very few drawing salaries of over $150 a month. From the standpoint of those who have been brought up around railroad offices, and have become careless of the responsibilities, these salaries appear large. They are ready and willing to jump at the chance of securing a "trick" simply for the sake of the salary, and in a measure oblivious to the graver responsibilities resting upon the shoulders of the dispatcher. Another consideration which makes such positions tempting bait for telegraphers and men who are in the line of promotion is the fact that most of them work only eight hours a day, and have no menial labor to perform. The position is a division between clerical and official work, and the amount of telegraphing done is comparatively small.

Before every dispatcher a large sheet, on which a record of every train on his division is kept, will invariably be found. Every train is known by number, and the numbers run consecutively, with no two alike. The east-bound trains are all numbered even and the west-bound trains odd. When train No. 2 leaves Camden Station, for instance, on the Baltimore and Ohio Railroad, the operator at the depot or yard office notifies the dispatcher that it has started, and states the time to the minute. The figures are marked down on the sheet by the dispatcher. Then train No. 1 leaves Washington for Baltimore. The dispatcher is notified when it leaves, and from that moment he keeps a record.

He must keep careful watch on all the trains under his surveillance and at times has a long kaleidoscopic procession moving in his brain. If they chance to be on a single track he must arrange so that they may meet and pass. But his brain doesn't whirl and his hair is seldom gray but from old age, and he is usually a happy, complacent, genial fellow, ready—whenever not engaged listening to his ticker—to give a civil answer.

The manner in which an operator notifies a dispatcher of the arrival and departure of trains is this: Each telegraph office is known by a letter or letters; for instance, let Baltimore be "UD," the Relay House "YD," Washington "V." When a train leaves "UD" the operator opens his key and makes the letter "S" three or four times and then adds the number of the train, the hour and minute of departure. The form is like this: "S s s, UD, No. 2 d 10.20 A," which means that train No. 2 left Camden Station at 10.20 A. M. When the train reaches the Relay the operator opens his key and clicks off: "S s s, R, No. 2 a 10.50 P.," and then when the train leaves he says: "S s s, R, No. 2 d 10.52 P." This means that train No. 2 arrived at the Relay at 10.50 and departed two minutes later. The letter "S" is used for convenience and to let the dispatcher know at once that a train report is coming, so he can be ready to write down the figures. The letter R indicates that the report comes from Relay, and enables the dispatcher to find the proper line for the figures to come before the instrument clicks them off. In case an operator desires to speak to a dispatcher, he uses the letter "D," or sometimes the letters "DL."

In offices where dispatchers work only eight hours there are three sets of men, who work in turns, or "tricks," one set relieving the other. The work never ceases, and as long as there is a train in operation the dispatcher must be alert. On some roads an average of 40 trains are kept on a "train sheet." This is done over a single track and one sheet is used every 24 hours. Where the road is double-tracked 160 to 180 trains to the sheet is a fair average.

The system of handling trains by telegraph, or train dispatching, was first introduced in 1856, by the New York and Erie Railroad. L. G. Tillotson, the New York supply agent, was superintendent of telegraph and sent the first train order. The use of the telegraph opened up an entire new field, and made it possible for railroads to-day to handle the tremendous interstate commerce of the country.

ELECTRIC LIGHT FLASHES.

Woodstown, N. J., wants electric lights.

Poultney, Vt., is considering the advisability of lighting her streets by electricity.

The first harbor dredge on the Atlantic coast to use electric lighting in order to carry on night work is now to be seen in Portland harbor.

Another 100 horse-power New York Safety engine is being erected in Wm. Campbell's paper hanging manufactory, Tenth avenue, New York, for driving an electric lighting plant.

The plant of the United States Electric Company, at Dubuque, Ia., was sold recently to a local syndicate. The price is understood to be $100,000. This is believed to mean a consolidation of all the electric companies in the city.

The city council of Carrollton, Ga., has sold the electric light plant of the city to a company, composed of Dr. J. J. Reese, Judge W. A. Turner and Mr. Clifford Turner. The new company will double the capacity of the plant at once and light every part of the town.

Something novel in the way of electric lighting will be done on the occasion of the third annual ball of the Massachusetts Electrical Engineers' and Mechanics' Association, which occurs in Odd Fellows' Hall, Boston, on the evening of Monday, January 30. The whole of the outside of the building will be profusely decorated with arc and search-lights, while inside there will be arrayed 1,500 incandescents in festoons.

At the annual meeting of the Connecticut Electric Lighting Association, held recently at Waterbury, 14 companies were represented and the following officers were elected: President, James English, treasurer of the New Haven Electric Company; first vice-president, James A. Hadley, of the Meriden Electric Light Company; second vice-president, James P. Stow, treasurer and general manager of the Middletown Electric Light Company; treasurer, John C. English, secretary of the Bridgeport Electric Light Company; secretary, A. M. Young, of Waterbury, secretary of the Connecticut Electric Company. With L. C. Whitney, of the New Britain Electric Light Company and Fred. F. Fuessenich, of the Torrington Electric Light Company, these officers constitute the executive committee.

TELEGRAPH NEWS.

A new telegraph wire has been strung between the Sault and Minneapolis.

A proposition is under discussion for a telegraph line from the Cape of Good Hope to Egypt.

The Mexican Telegraph Company has declared a regular quarterly dividend of two and one-half per cent., payable January 17.

The Central and South American Telegraph Company has declared its regular quarterly dividend of one and three quarters per cent.

The general office of the Edison Mutual Telegraph Company will be moved from Van Wert, O., to Fort Wayne, Ind. The company will have lines connecting Van Wert, Lima, Delphos, Greenville and Piqua in Ohio, and Fort Wayne, Kokomo, Muncie and Anderson, Ind.

The annual meeting of the Northern Telegraph company was held at Manchester, N. H., on December 27. A dividend of 3 per cent. was declared and the following officers elected: President, Frederick Smyth; clerk, Charles H. Bartlett; directors, Frederick Smyth, Charles H. Bartlett and Wilber E. Clarke.

The Western Union Telegraph Company proposes to make extensive and expensive improvements in its newly acquired property at the southwest corner of Clark and Jackson streets, Chicago. A permit has been secured from the city building department for making alterations and additions to the amount of $50,000.

Captain W. H. Gear has not been retired from his place as police telegraph operator in the Brooklyn police department. He has been excused from duty for some time, owing to serious trouble with his sight, and his place will be retained for him pending the result of an operation on his eyes. Captain Gear has been a member of the Brooklyn police force for more than 30 years.

Superintendent Kimball, of the Life Saving Service, was recently informed that the United States telegraph and telephone line between Assateague and Cape Charles, Va., has been put into operation. This line supplies a connecting link to lines that run at either end to Cape Henlopen and Lewes, Del., making a complete line 165 miles long along the most dangerous coast of America.

In the United States Circuit Court at Portland, Ore., on December 21, Judge Gilbert rendered a decision in the damage suit of Fleischner, Mayer & Company against the Pacific Postal Telegraph Company, awarding the plaintiffs $3,707, the amount claimed. In June, 1891, they filed a dispatch to an attorney in Seattle instructing him to present a claim for $4,700 against a firm that had just failed. The message was not sent, owing to the line being down, until several hours had elapsed, during which time the other creditors filed claims ahead of them. The court held that the defendant was negligent in not notifying the plaintiff of its inability to send the message.

Charles Selden, superintendent of telegraph of the Baltimore and Ohio Railroad, is quoted as follows: "We will reconstruct our telegraph lines. Arrangements are now being completed to give out contracts for $22,000. These will be placed between Grafton, Parkersburg, Benwood, Bellaire, O., and Garrett, Ind., covering a distance of over 500 miles. Where new wires are wanted we will use the copper wire in the place of the iron wire now in use, as the copper wire weighs less, offers less resistance to electricity and does not rust. It is not affected by the smoke from the engines. On the recent inspection trip we found but 78 glass insulators broken out of nearly 1,250,000 which we examined. This is a remarkable record."

The New York Police Commissioners last week accepted the resignation of James Crowley, superintendent of the police telegraph. It took effect on January 1. Superintendent Crowley is the senior of the entire police force in point of years of continuous service. He was appointed superintendent of the telegraph system on September 12, 1860. The board promoted Michael R. Brennan, assistant superintendent, to fill Mr. Crowley's place. The salary is $3,000. The board has $50,000 to expend in improving the telegraph system under his direction. The various station houses will be furnished with printing telegraph instruments. Edward H. Murphy, a Morse operator, who has been in the bureau 12 years, was made assistant superintendent, at a salary of $3,000. Both appointments are subject to civil service examination.

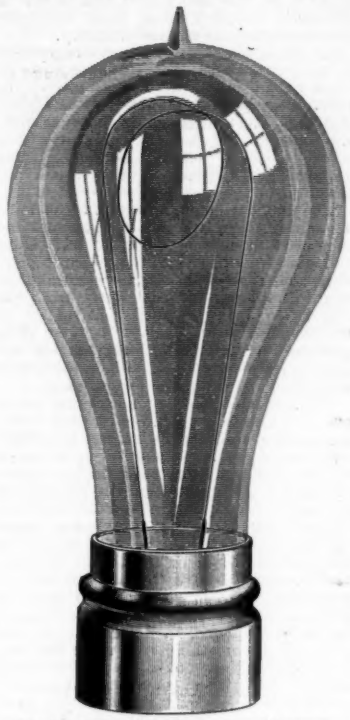


FIG. 1.—THE DE KHOTINSKY LAMP.

Engineering says: "The telegraph system of Italy is almost entirely owned and operated by the government, with the exception of the lines belonging to the railway companies, operated by them for their own purposes, and in some cases for private business. The ordinary messages are sent at a fixed rate of 20 cents per 15 words or less, including the address. Urgent telegrams have the precedence over all others, and are charged 60 cents for the same number of words. These rates are the same throughout the entire kingdom, no matter what the distance. The number of employés in 1890 was 7,511. The gross earnings of the system in 1890 amounted to $3,010,974, and the expenses to $2,703,137, leaving a net earning of $307,837. The aggregate length of wires in 1890 was, 83,270 miles. The number of telegraph offices operated by the railway companies in 1890 was 1,507. About the only criticism made in Italy upon the present telegraph system is that the tariff is considered rather high, which applies equally to the postal system, but the economic and financial conditions of the country are such that a reduction is not easy."

Fire-Proof Building for Bicycles.

The Berlin Iron Bridge Company, of East Berlin, Conn., have secured the contract for a new iron fire-proof store-house for the Pope Manufacturing Company, at Hartford, Conn. The building will be 40 feet wide by 84 feet in length, two stories high, and will be used for storing the separate parts of bicycles, as the Pope Company have to carry a very large stock of the different parts to supply the wants of the numerous users of the Columbia "Safety."

Electric Wire Regulations in Paris.

The new regulations issued by the municipality of Paris, governing the laying of wires of private electric companies, entirely prohibit, says the *Engineering News*, the placing of such wires in sewers or other underground conduits located between the curbs, and demand the laying of such wires under the sidewalks. The materials used in the conduits must be approved by the proper municipal officers, who are also to specify the position, exterior diameter and required depth of the conduits. The most favorable positions, near the surface of the streets, are reserved for the municipal electric light conduits. In order to avoid crossing streets to make house connections, a conduit must be carried under the sidewalk on both sides of the street, except in very narrow streets. Whenever a conduit crosses a street, it is to be made accessible by a manhole on one side. In very important thoroughfares each side must be furnished with a manhole. If several companies are laying wires in the same street, a common conduit must be employed, the accruing costs to be shared equally between them.

Electric wires of private companies are not to be carried closer than 3.28 feet to the front walls of houses, which space is to be reserved for the laying of municipal wires. The connections are to be carried in conduits of smaller diameter to the limits of the house. Other branches from the conduits and transformers are to be placed outside the street.

The application for a permit for laying electric wires must be accompanied by detailed plans, for the preparation of which the municipal records and plans of sewers, water conduits, etc., may be consulted. The general plan, drawn to a scale of 1-1,000, must show the proposed conduits, with house connections and the number of lamps. The amount of power to be supplied, the position and material of the cables and the size and material of the proposed conduits must be specified. The details must be shown on a scale of 1 in 20 to 1 in 50.

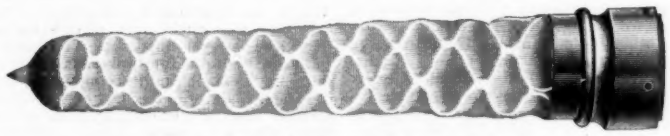


FIG. 2.—THE DE KHOTINSKY ICICLE LAMP.

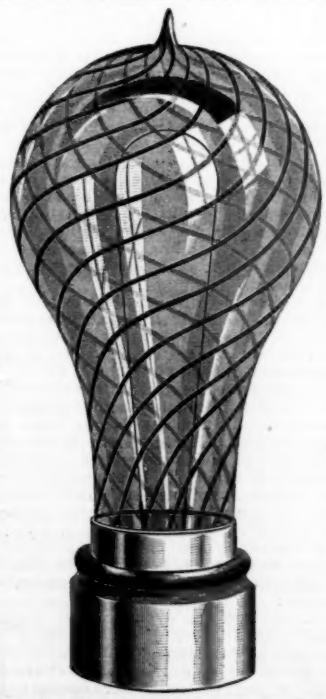


FIG. 3.—THE DE KHOTINSKY STRIPED TRANSPARENT LAMP.

Before the pavement is disturbed, the company must pay the city for the proper relaying of the pavement at the following rates per square meter: Macadam, $0.56; asphalt, $3.00; wood, $3.80; flagging, $0.95.

Foundations are charged extra at $0.75 per square meter for sand and $1.50 for concrete. Curbing is charged at $1.29 per lineal meter (39 cents per foot).

De Khotinsky Decorative Lamps.

The illustrations on this page show three new forms of incandescent lamps for decorative purposes. They are from designs by Capt. A. De Khotinsky and are manufactured by the Germania Electric Company, of Boston.

The first is the regular form of De Khotinsky lamp, with a coiled filament and clear white glass globe. In Fig. 2 is shown a novel and pleasing form of lamp, which is called the "Icicle," from its shape and the resemblance of the glass globe to an icicle. The lamp shown in Fig. 3 is decorated with striations of different colored glass laid onto the usual white glass globe. All the glass used in this lamp is transparent.

The use of incandescent lamps for decorative purposes is rapidly increasing, and the Germania Electric Company is preparing to meet the demand.

Dinner to Col. John A. Cockerill.

The members of the New York Press Club, desiring to testify their regard for Col. John A. Cockerill, who has been president of the club for four years past, gave a dinner in his honor at the Hotel De Logerot, Wednesday evening, December 28. It was a unique occasion and was probably as representative a gathering of New York journalists as ever assembled in this city, 120 being present.

Letters of regret from Henry Watterson, John R. McLean and M. H. de Young were read and applauded.

Mr. Geo. H. Fleming presided, and, in response to his kindly introductory remarks, the guest of the evening, Col. Cockerill, delivered a brief and feeling address expressing his deep appreciation of the honor he had received.

Joseph Howard, Jr., responded to "The Guest of the Evening," and, though he said he had no taffy to distribute, paid a high tribute to Col. Cockerill and stated that he was one of the first to welcome him when he came out of the West to New York city. Mr. Howard's remarks were in his best vein and were continually applauded.

The newly elected president of the club, Mr. John W. Keller, spoke enthusiastically to the toast of "The New Press Club," and urged united and continued effort on the part of all its members.

Mr. Robert B. Roosevelt spoke of "The Newspaper Man Abroad," and very wittily said that the newspaper man was never abroad.

Hon. Amos Cummings talked eloquently of the record of Colonel Cockerill as a drummer boy at Shiloh, and spoke in glowing terms of all of the past presidents of the Press Club.

He was followed by the Hon. Chauncey M. Depew, who spoke in his usual graceful and highly entertaining manner. In conclusion, he paid a glowing tribute to Col. Cockerill, during which he said that the most picturesque figure of our time, Tecumseh Sherman, turned to him (Cockerill) at a dinner and spoke of the Cockerills, father and son, as being as true soldiers as ever stood behind a gun.

"For such a compliment, and from such a source," said Mr. Depew, "I would exchange all I have in the world."

Nat Goodwin then made a rattling speech and was heartily greeted.

Other speakers were Peter K. McCann, Charles Sotheran, Col. William L. Brown, Melville D. Landon (Eli Perkins), George F. Lyon and William Berri, who responded to toasts.

Mayor Hugh J. Grant was present as were nearly all the prominent newspaper men of the city, including Murat Halstead, Chester S. Lord, Robert Edwin Bonner, W. J. Arkell, J. E. Milholland, George Bartholomew, Bernard Gillam, Col. W. L. Brown, Edward G. Riggs, Charles O'C. Hennessy, William Berri, Herman Ridder, Ernest Jarrold, Dr. Joseph Senner, Hon. Ellis H. Roberts, Foster Coates, Vincent S. Cooke.

Electricity in the Art of War.

BY LIEUT. C. D. PARKHURST, U. S. A.

(*Concluded.*)

Where anything like the inclined railway and telescopic rammer are used, it is simply a matter of detail to substitute electric for other power. With an electric training motor the gun breech can be thrown around to the loading position with ease and rapidity, the breech lowered, and the gun thus put rapidly in the position for loading. In the meantime the shell room crew have the ammunition for the next round all ready in place upon the railway in front of the rammer. As soon as the breech is in position the railway is raised to its position, lifting away the cover over it automatically, and the rammer slides the projectile and cartridge to its proper seat in the breech. The railway then lowers, automatically closing the cover; the breech block is closed, and there you are with the gun loaded, ready to train to its proper azimuth and elevation as given from the range-finder.

It may be objected that we are developing a very complicated and costly outfit to reap but a doubtful advantage, and that we will need a crew of trained electricians, mechanics and the like in place of cannoneers.

As to the first objection, it can be said that the outfit may be costly but it need not become complicated. Guns are costly, war is costly, but that we can have nothing whatever to do with. We must have the best of modern high power guns for our national defense, or sink to a low rank among nations. To handle these guns we must have the best power that modern science can give us, no matter what it costs; but when it so happens that the best power is also the cheapest, it would look as though there was but one thing to do, and that is adopt the best because it is the cheapest, not only in the long run, but in actual cost of operation and maintenance.

As to complication, there need be none. Doubtless the first installation would have many faults. Every art and science has had to "creep before it could walk." As to the qualifications required of our men, let it be granted that they must know more and do more than in days gone by.

But of all the powers that may be used to give us the aid that we must have, electrical power requires the least technical knowledge upon the part of the operative. Motors have no boilers to blow up and create havoc. They require no fuel except that supplied by a simple wire that, if properly put in, will not burn one's fingers, shock ones nerves or set fire to the surroundings. Water does not run low and need constant attention. All the operator has to do is to turn a switch and he has his power under full control.

In all future warfare, whether we use our present black powder or any of the recently proposed smokeless powders, complete and thorough ventilation must be provided for all our casemates, turrets or other covered works, and for galleries, passages, connections, bomb proofs or magazine and shell rooms connected to the work that may fill with smoke, or with the noxious gases developed by the combustion of smokeless powder.

All underground galleries, magazines, shell rooms or other appurtenances to the work will also need artificial ventilation to make them habitable and endurable in the heat of an engagement, or for prolonged occupation at any time. These requirements again call for the application of power, and again in the electric motor and blower combination we have the power and its application for the solution of our problems.

These combinations were first invented for the ventilation of engine and boiler rooms and stoke-holds on board ship. By their use *no further heat is developed*, as would be with any form of steam engine, but all the energy would be devoted *to cooling the space* by the rapid removal of the already heated air and its renewal by a supply of cool fresh air from some outside source. Such blowers have been, and are, in use upon the cruisers "Baltimore," "Charleston," "San Francisco," "Philadelphia" and "Petrel," and, doubtless now, upon all of our naval vessels. They have been most favorably reported upon, not only as to their effective work, but also because of the little trouble they give in their use or in keeping them in order.

We, therefore, have a combination that is simple, durable and effective, that occupies but little space, and that has the power to move large quantities of air per minute. They have been constructed to move as high as about 5,000 cubic feet of air per minute, with a diameter of inlet of 16 inches, diameter of outlet the same, the fan or blower moving at a rate of 875 revolutions per minute. Smaller outfits (and, doubtless, larger ones) are to be had, so we can have no excuse for not having all covered works or other appurtenances to our works, not open to the free winds of heaven, perfectly ventilated and rapidly freed from smoke or noxious gases.

Space will not permit of more than mention of the range-finding problem. The details of this most important question have been well worked out by many independent workers, both at home and abroad. In every scheme of practical utility electricity enters as the working force. Our forts will not be fully equipped or fully efficient until all are supplied with the best range-finder that is to be had, so that we can at any time, by day or night, locate and track an enemy's vessel, and by signals if we must, automatically if we can, indicate to the guns the proper azimuth and range to reach the target.

When this becomes possible, and that it is impossible who will say, the gun captain may then direct his piece as absolutely and accurately without seeing the target as if it were in full view. Indirect fire thus becomes a possibility; it is now simply a great desideratum.

The conjoint defense of one of our harbors by land and sea necessitates some reliable and prompt means of communication between forts and ships.

The flag and torch, reliable as they may be for want of better, sink into insignificance before the possibilities held forth by electricity. One squadron of our fleet now has an installation that we at the Artillery School have all seen. What is to prevent the same system from being installed as a permanent feature of each of our seacoast forts? For long-range night signaling the search-light used by flashes or in any other preconcerted method can be seen for miles; it is also thought that it could be used by day the same as any heliostat.

Let us now pause for a moment and see what we need for a seacoast fort:

1. The search-light.
2. Inside illumination for night work as well as general illumination for every-day affairs.
3. The generation and transmission of power.
4. Signaling installations.

All these require the dynamo; the range-finder and ordinary telegraphic or telephonic communications can be by the galvanic cell.

We then require a central engine, or engines capable of generating the requisite horse-power to drive our dynamos. From the central station our mains must lead to the search-light station, carrying a powerful current for arc light use. From our station again other mains must lead out to cover the area of the incandescent lamp circuit. Again, mains must be placed for our electric road, and possibly for the motor service.

In the aggregate an enormous horse-power will be called for in anything like a large-sized fort with many guns, and it might be interesting to work out the actual power required for a supposed site. But without going into this it may be said at once that the power actually installed need not be the gross aggregate of all the horse power called for on all the circuits.

It has been proven by experience that the commercial central station can lease or sell more power in the aggregate than it actually possesses. It can engage to light more lamps than the dynamo can possibly supply at its full load; and why? Because experience has shown that never will all the motors or all the lamps be in use together.

In our installation the incandescent installation for battle or night work would not be in use except occasionally in time of peace. Conversely the installation for barracks and quarters would not be in use in battle; hence these two circuits would not interfere with each other, and their aggregate need not be taken.

It is hardly to be supposed that all the gun-motors would be in use at the same instant. Still it might happen, and to be on the safe side, perhaps enough power should be calculated upon to provide for all.

As stated once before, the navy has shown by their ship installation that arc lamps and incandescent lamps can be run from the same dynamo. It can also be shown that both kinds of lamps and motors as well can similarly be supplied. In commercial practice, however, independent power circuits are now being installed as better meeting the economical conditions of the problem.

It is possible, then, to have what we want just as we want it to best fulfill the military condition, and that, too, in an economical manner.

We can have one dynamo or set of dynamos to run all three of our circuits, or we can have a set for each. As the motor service would be needed in battle, either by night or day, we could have special dynamos for that service, while the search-light and incandescent service could have their own dynamos. Study and investigation of the best conditions to meet the problem would soon tell us what best to do, while the experience and intelligence of our civilian electrical engineers and experts should be invited to our aid.

Mention was made some time back of the necessity for trial to prove or disprove theory; the list of applications in which the use of electrical power has been most successfully demonstrated is altogether too long for me to repeat. Almost every day some new problem, some new application, is successfully met and accomplished, until now the power user has but to make his demand to be reasonably sure that he will be efficiently supplied, thus most decidedly demonstrating the success of theory.

As events have turned out we are perhaps to be congratulated that we have made no more advance than we have in solving the problem of proper mounts for our guns. Not being committed as yet to any system, we have the whole field before us from which to select, without having anything yet made and in place to hamper us in our selection.

The time has come, however, for us to do something. We are making our guns and they need mounts to be of service. Guns and platforms need forts in which to place them; and, as we now have nothing, or next to nothing, we can build from the foundation up, with such construction as will the most readily adapt itself to these questions of generation, transmission and application of power, as well as the proper protection and command for our guns.

And, because electric power has not as yet been used to any extent for such work, we need not wait for its success to be demonstrated by someone else before we adopt it. Its success in every other field is beyond all doubt. Its application to the various problems of gun control and fortress service and warfare is but a matter of detail that can most certainly be met and successfully accomplished in spite of all the prognostications of failure that may be brought against it. We must remember that all advance and knowledge has been brought about by someone, at some time, at some place, doing something that never had been done before; this, too, in the face of opposition, of ridicule and sometimes of absolute persecution. It was mathematically demonstrated that a steamship could not cross the ocean for want of room for her coal. Yet while this was being discussed, an American ship steamed into an English port. It was proven beyond a doubt that an iron ship could not float; yet, while it was being proved, iron hulls were being launched. Look at our "greyhounds of the sea" today, and then laugh at these doubts and predictions of failure if you will. Are they any more ridiculous than are the croakings, the doubts, the indifference, the inertia of military men the world over when something new and as yet untried as a military adjunct is brought forward as an improvement upon existing military methods?

When, therefore, the power has shown what it can do successfully in every other field; when its generation and application have been proved to be both certain and efficient, as well as economical and within control, should it not be recognized and welcomed, be tested, be experimented with in every way, and every facility be given, both to those of the army and navy as well as our civilian engineers, to bring it to its full development for military use?

Let us hope, therefore, that, as our guns are built, our platforms laid, our carriages erected, and our forts planned and constructed, and we finally find ourselves once more possessed of a seacoast defense worthy of the name, we may find therein the dynamo as a vital part; we may have the search-light, electric light and power for the use of our guns, and thereby have the aid of electricity in the solution of our part of the problem of the art of war.

New Calendars Received.

F. E. Fowler, newsdealer, of Uncasville, Conn., has sent us a pretty calendar with a good half-tone cut of a United States cruiser as the decoration.

Superintendent Ellis B. Baker, of the Southern New England Telephone Company, is sending out a calendar tastefully printed in colors and showing on a map the metallic circuits of the company, which provide an efficient service to all important points in Connecticut and a few outside the State.

The Detroit Electrical Works evidently believe that one cannot have too much of a good thing, so they send three handsome calendars, one showing a steel engraving of a landscape and the others a half-tone reproduction of a United States man-of-war, and both advertising the well known electrical apparatus of the company.

Hello, Central!

(*From the Harvard Lampoon.*)

"Did you say you had a calling acquaintance with her, Dick?"

"Yes, she's in a telephone office."

The Phunny Man and the 'Phone.

[From *Life.*]

Scene in a long distance telephone office in New York. Clerk in charge. Enter, a man in a hurry.

Man in a hurry—Can I telephone to Boston here?

Clerk—Yes, sir.

Man in a hurry—How much do you charge?

Clerk—Two dollars for five minutes' conversation.

Man in a hurry—All right. Ring up Boston and get me the Public Library.

Whirr-r-r-r.

Clerk (in 'phone)—Hello! Give me Boston. (Pause.) Hello! Boston? I want the Public Library. (Pause.) Hello! Public Library? Here you are, sir.

Man in a hurry, in 'phone—Hello! Is this Boston?

Voice in 'phone— —— —— —— ——

Man in a hurry—Of course. I know that. I didn't think I was talking to the whole city. Where are you at?

Voice in 'phone—

Man in a hurry—Confound your impudence! I didn't ask you anything about sending sentences with prepositions. I want the Public Library.

Voice in 'phone—

Man in a hurry—Well, why didn't you say so at first? We haven't got no time in New York for prepositions. Tell—What's that?

Voice in 'phone—

Man in a hurry, shouting at the top of his voice—Jumping Jupiter! Do you suppose I'm going to pay $24 an hour to have you teach me grammar through a telephone?

Clerk (interposing)—If you talk in an ordinary tone of voice, sir, you will be heard much better.

Man in a hurry—Confound you, let me alone! I'm talking to an idiot 200 miles out of my reach.

Clerk (apologetically)—Excuse me, sir.

Man in a hurry—Hello! Boston Public Library! I want to talk on a matter of great importance with Mr. Smith.

Voice in 'phone—

Man in a hurry—Smith. S-M-I-T-H, Smith!

Voice in 'phone—

Man in a hurry—By all that's—excuse me! I don't care whether he spells his name with a Y or an I. Is he in?

Voice in 'phone—

Man in a hurry (epileptically)—Then why in thunder and all the elements didn't you say so at first? Geewilikins! If I had you here I'd—

Clerk—Five minutes are up, sir.

Whirr-r-r-r.

LITERARY.

The Hartford *Courant* recently issued a large and well printed special issue of an industrial character. Among the prominent manufacturing companies mentioned were the following, which are well known in the electrical field: Berlin Iron Bridge Company, East Berlin, Conn.; Sessions Foundry Company, Bristol, Conn.; the Schuyler Electric Company, Middletown, Conn; and the Mather Electric Company, Manchester, Conn.

The young men and young women who aspire to obtain academic or college educations, and whose parents cannot well afford them that expense, will be interested in the work of the *Cosmopolitan Magazine*, which has offered for the year 1893 one thousand scholarships at any of the leading colleges or schools of the United States, upon the condition of introducing the magazine into certain neighborhoods. Yale, Vassar, Harvard, Ann Arbor, Chicago, the Southern colleges, the great schools of art and medicine, all are alike open to the ambitious boy or girl who is not afraid of a little earnest work. The *Cosmopolitan* sends out from its New York office a handsomely printed pamphlet to any applicant, telling just what is necessary in order to secure one of these scholarships. The scholarship itself includes board, lodging, laundry and tuition—all free.

ADVANCE INFORMATION.

New Electric Companies Formed and Important Constructions Projected.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week:

New Electric Railways.

LOWELL, MASS.—The Lowell, Haverhill and Lawrence Street Railway Company has petitioned for rights to build in North Andover and Bradford. It also asks the right to buy the Groveland road.

WHITE PLAINS, N. Y.—An electric railway from Tarrytown to this village and Port Chester is talked of.

NEW YORK CITY.—The Columbus and Ninth Avenue Railroad Company are to build a three mile railway from Columbus avenue and 64th street to connect with the Ninth avenue line across the Boulevard. Capital, $3,000,000. The Pavonia Ferry Railway Company, to build a surface line seven miles in length, from 42d street and Lexington avenue to the Harlem river. Capital, $5,000,000. The directors of both corporations are A. N. Brady, of Albany, P. E. Bray, John Beage and Samuel Goldsticker, of New York city.

CANANDAIGUA, N. Y.—Local capitalists are considering a project to build an electric road from Canandaigua to Palmyra. The line would benefit a number of towns.

WOODBURY, N. J.—At a recent meeting of the city council a committee was appointed to look up the matter of building an electric railway from Camden to Woodbury.

GETTYSBURG, PA.—The council has granted right of way on all the principal streets of the borough to the Electric Street Railway Company, which will build a line on the battlefield.

KANSAS CITY, KAN.—The West Side Street Railway Company will extend its electric road to Quindaro.

PORTLAND, ORE.—The Portland and Vancouver Railway, now operated by steam motors, will be equipped with electricity. The road is owned by the Multnomah Consolidated Railway Company.

PITTSBURGH, PA.—A big company, composed of Pittsburgh capitalists, has been organized for the purpose of building a through street car line from Pittsburgh to Elizabeth. The cars will traverse over 35 miles of territory. The company will be known as the Pittsburgh, Dravosburg, Mendleson and Elizabeth Street Railway Company, and Homer Sweeney, an attorney, will be its president. Electricity will be the motive power.

NORWALK, O.—Parties from New York, interested in electric street railroads, are in Norwalk with a view to purchasing the Norwalk electric light plant. Should the deal be consummated, they will construct an electric street railway throughout the city.

CITY OF MEXICO.—James S. Clarkson, ex-assistant postmaster-general; V. T. Meek, president of the Colorado Iron Company; I. W. Clay, of Philadelphia, and T. H. Blakewell and H. Hobert, of New York, have been here for several days negotiating for the purchase of the city and district railways, about 200 kilometers long. The price is said to be $9,000,000, although some say $7,000,000. It is intended to work the railroads by electric power.

ELLSWORTH, ME.—There is some talk of an electric street railway in Ellsworth. The plan is to build a line from the Falls village to East Surry to make connection with the Rockland steamers at that point.

WORCESTER, MASS.—Arrangements are being perfected to extend and complete a system of electric railroads that will bring Worcester in direct communication with Providence.

ST. LOUIS, MO.—A project is on foot to form a street railroad trust in this city, to control and operate all railroads. The electric road mileage is now very large, and ordinances authorizing the construction of over 60 miles of additional tracks are now before the municipal assembly. The old companies have formed a combination against applicants for new franchises.

PORTSMOUTH, VA.—The dummy railway between this city and Fort Norfolk will be changed to an electric line in the early spring.

KANSAS CITY, MO.—Arrangements for the construction of an electric railway on Holmes street are being made. The company is not yet fully organized, but several Kansas City capitalists are interested.

MADISON, WIS.—The Madison City Railway Company has increased its capital stock from $75,000 to $100,000.

WINDSOR, ONT.—The Windsor and Walkerville Street Railway has been sold for $15,000 to Detroit capitalists. The new company will equip the road with electricity and extend it.

SALEM, MASS.—A New York syndicate has made an offer for the stock of the Newburyport and Amesbury Street Railroad Company, and the purchase will probably be made.

NILES, O.—The contract for constructing the electric street railway from Warren to Niles was let last week to the Pennsylvania General Electric Company, of Pittsburgh. The line will cost $100,000. The contract stipulates that the line must be ready for operation by June 1, 1893.

Electric Light and Power.

TROY, N. Y.—Articles of incorporation have been filed by the Green Island Electric Light Company. The capital stock is $25,000, and the directors are Charles W. Marsh, Knight Nefelt, William H. Leragh and Charles E. Barrett.

ADDISON, N. Y.—Invites proposals for erecting and operating an electric light plant for a period of five years.

TRENTON, N. J.—The Associated Electric Company; capital, $20,000. A. R. Kuser, president; Philip Frendenmacher, vice-president; J. Wallace Hoff, secretary and treasurer. The company proposes to erect, maintain, operate and sell telegraph, electric light and power plants, lines and works, and electric appliances, apparatus and supplies. A messenger service and telegraph business will be established.

LOWELL, MASS.—James Francis, agent of the Locks and Canal Company, of this city, corroborates a report that the company has under consideration a plan for utilizing available water in the Merrimac river, not now utilized, for making power and distributing it by electricity.

JONESBORO, ARK.—The Jonesboro Power Company; capital, $7,000, has been incorporated by George W. Ducker, of Newport, Ark.; J. C. Hawthorne, N. F. Lamb and S. A. Warner, Jr., of Jonesboro. The company is organized for the purpose of erecting an electric plant at Jonesboro.

LISBON FALLS, ME.—A number of business men seem interested in a project to light the town by electricity.

LONGVIEW, TEX.—An electric light plant will be put in at this place.

COLUMBUS, GA.—It is said that Northern capitalists are about to establish an electrical plant at this place.

GLENDALE, O.—A movement towards establishing an electric lighting plant prevails here. R. D. Mussey can be addressed for particulars.

MONTREAL, CAN.—The Merchants' Electric and General Service Company has applied for letters patent. Incorporation is sought for the purpose of manufacturing an electric burglar alarm. Capital stock, $30,000; directors, S. H. Ewing, A. W. Ogilvie, Edwin Hanson and Samuel Finlay.

CHICAGO, ILL.—The Chicago Portable Electric Company; capital stock, $1,000,000; incorporators, L. K. Davis, Lavell B. Rogers and Arthur L. Blunt.

LORELY, MD.—F. H. Corthell and Company, of Boston, Mass., will build a $20,000 electric plant at Lorely.

OWENSBORO, KY.—The Monarch Electric and Power Company; capital stock, $600,000; president, R. Monarch.

MAYFIELD, KY.—The Water Works Company will erect an electric light plant.

SACO, ME.—The Ajax Insulation Company; capital, $1,000,000. Charles A. Sawyer, president, Boston. The company will manufacture electrical supplies.

ANSONIA, CONN.—The Electric Copper Refining Company has increased its capital, and will build an addition to its plant.

ROCKLAND, ME.—A project for introducing electric power for hoisting and pumping at the lime quarries is being considered.

DUBUQUE, IA.—The Star Electric Company has been incorporated, with a capital of $20,000. The plant of the United States Electric Company has been purchased.

MCKEESPORT, PA.—Extensive improvements are to be made to the McKeesport lighting plant. Address James S. Kuhn for particulars.

AKRON, O.—The present electric lighting contract expires in February, and it is stated that efforts will be made for a new contract.

MIDDLETOWN, N. Y.—The local electric light company is about to put in two 150 horse-power condensing steam engines and one 2,000 light, alternating, incandescent dynamo in addition to the present capacity.

NORTH ATTLEBORO, MASS.—The contract of the town with the North Attleboro Electric Light Company for lighting the streets expires January 1.

EDINA, MO.—The people of this place have voted for electric lights.

MADISON, NEB.—This place is to have electric lights.

WESTPORT, MO.—An electric lighting plant is proposed for this place. Alderman Dornseif can furnish particulars.

SPRINGFIELD, MASS.—A municipal electric lighting plant is proposed here. Alderman Hyde can give details.

ROANOKE, VA.—The City Council has awarded the contract for public lighting to W. H. Mackay at the following figures: There are to be 100 arc lights, of 2,000 candle power each, at 19 cents per light per night, to be lighted from sunset to sunrise every night in the year, the contract to continue in force for five years, the city reserving the right to renew it for a like period at a rate not in excess of these figures. In addition, the company is to pay to the city 25 cents for every light allowed to remain unlighted for three hours, unless the same is intentional, in which case the city shall receive $1 for every fifteen minutes such lamps remain unlighted during any night.

New Manufacturing Companies.

PERU, IND.—The merging of the Peru Glass and Carbon Company into the Peru Electric Manufacturing Company, with an increased capital stock of $100,000, promises to make this the largest concern of the kind in the United States. It is expected to employ 300 people. In order to meet the demand for more room, the large Dow buildings, covering three acres, are being utilized and other buildings are also being built. Home capital is at the head of the enterprise. Electrical supplies will be manufactured.

SHELBYVILLE, KY.—The Shelbyville Commercial Club has taken steps to organize an electric light company.

The Triumph of the Trolley in Philadelphia.

[From the Philadelphia *Record.*]

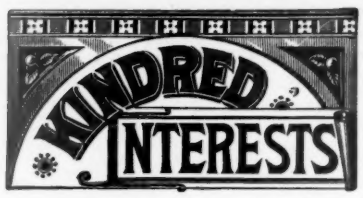
The amount of mental and physical misery and positive loss of time and money entailed by horse car transit in foul weather, all Philadelphians know to their sorrow. Under the adverse conditions presented by yesterday's snowfall, the value of the trolley system in use on the Bainbridge and Catherine streets line was demonstrated more clearly than ever to the thousands who found shelter, comfort and unimpeded transit in the attractive cars.

The triumph of the trolley has swiftly vindicated the judgment and foresight of the advocates of a greater Philadelphia, and as quickly confounded the insensate clamor raised against it. No one has been shocked, no buildings have been laid in ashes, and the black gridiron of wires that was depicted on alarming posters not many months ago has dwindled in the reality to a wire almost imperceptible to the ordinary gaze—a mere cobweb-like thread at such an elevation in the air as to be in many cases above the housetops.

The test of a few days experience has not only silenced criticism, but has even converted critics into eulogists. Newspapers which had prophesied all manner of evil have abated their tales of woe, and by their silence have virtually conceded the error of their past position. The admission of error will doubtless become universal among the ranks of former opponents of the trolley system after its qualities of speed, comfort, promptitude in stoppage, cleanliness, healthfulness and safety shall have been demonstrated to the satisfaction of the riders on the Catherine and Bainbridge streets line.

It is not so widely known as it should be that the new system in use in this city is the most complete of its kind in the world in every detail of construction. To Southern Philadelphia the innovation is likely to prove an especial boon and boom; but its advantages are not to be circumscribed by sections. The entire city will receive new impetus from the adoption of the trolley system. How much this may mean in the improvement of real estate, the quickening of business, and, in fact, in every direction in which municipal expansion is possible, is not to be estimated at this time. As a well-informed gentleman was heard to say yesterday: "This will jump Philadelphia as nothing else has done since consolidation time!"

Every Philadelphian and every visitor to the city should take a ride on the new line, both for the pleasure of the trip and for the enlightenment to be derived from it. One trip will satisfy the unbiased mind that Philadelphia owes a debt of gratitude to the brainy, progressive men who have built this line in the face of strenuous opposition and unsparing vilification. They have increased the scope of urban extension by introducing the only practical system of rapid transit, in the present stage of invention, for the existing and future needs of a city of such vast area as Philadelphia; and the value of this public service will be more freely and heartily acknowledged with every coming year. The more the people shall see of the trolley the more trolley they will want.



Otis Brothers & Company, of New York, will install one of their electric elevators for passenger service in a new bank building at Oakland, Cal.

The Wilmington City Electric Company, of Wilmington, Del., have placed the contract for their new boiler house with the Berlin Iron Bridge Company, of East Berlin, Conn. The building will be made entirely of brick and iron, from the designs of the Berlin Company.

The Edson Recording Gauge has made many friends during 1892 and begins the new year with an enviable and ever-increasing reputation as a valuable and reliable accessory to any steam plant. "No electric power or light plant is complete without it." Those who are not familiar with this device will do well to correspond with the sole manufacturer, Jarvis B. Edson, 87 Liberty street, New York city.

The Philadelphia Branch of the New York Safety Steam Power Company has been doing a good business of late. Several prominent establishments have been equipped with Safety power engines, among these being the Bullitt building, three 100 horse-power; the Provident building, two 80 horse-power; Brown building, one 30 horse-power and one 50 horse-power; the *Times* annex, one 60 horse-power; Hotel Stratford, one 80 horse-power and one 125 horse-power; the new Deaf and Dumb Asylum, Mt. Airy, Pa., four 60 horse-power.

The Partrick & Carter Company, 125 South Second street, Philadelphia, Pa., has just finished a very satisfactory business year. This is one of the old reliable supply houses, the company having been in business over a quarter of a century. While the company makes and deals in everything electrical its specialty is house and hotel goods, for which it has an enviable reputation. The Partrick & Carter Company manufactures for and sells to the trade exclusively, and does not enter into competition with its customers doing construction work.

Large Additions to an Already Extensive Plant.

The Joseph Dixon Crucible Company, of Jersey City, manufacturers of Dixon's "American Graphite" Pencils, are taking time by the forelock by putting a fifth story, 175 x 75 feet, on their pencil factory. During the past summer and fall they have been unable to promptly fill their orders for Dixon's pencils, even though working their already superior facilities to their full capacity. It was therefore decided to push forward the work at once, instead of waiting until spring, as intended. The new addition will be equipped with new and improved pencil machinery of their own invention. As in the great pork packing establishments of the West, where piggy starts in as straight pork and comes out hams, shoulders, bacon, spareribs, tenderloins, sausage, head cheese, pickled pigs' feet, bristle brushes, etc., so Florida cedar and American graphite will start in and come out of Dixon's new machinery in "round" and "hexagon" shape, "regular size" or "tablet," "full length" or "pocket," for "office," "school," "carpenters'" or "artists'" use, in "satin," "maroon," "ebony," "cedar" or "natural" finish, and in the thousand and one styles in which we now have our pencils served to us.

Besides this large addition to their pencil factory, the company will establish a rubber and brass plant for the manufacture of the various pencil accessories and novelties.

As it was only in 1891 when the Dixon Company put extensive additions on their crucible and black-lead works, and erected offices which for size and beauty are second to none in the State, it is very evident that prosperity claims the Dixon Company for its own, and that the company is well officered and wisely managed.

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Consisting of about 28 acres of land in East Providence, R. I., three miles from the City of Providence, upon the Seekonk River, and upon the Providence and Worcester Railroad, affording excellent water and railroad communication.

The BUILDINGS are mainly of brick, and of the following dimensions:

One building 160x65; four stories.
One building 200x50; one story, with attic.
Two buildings 150x60; one story.
One building 200x30; one story.
One building 200x40; one story.
One building 130x60; one story.

The one story buildings are constructed with walls suitable for an additional story.

Also engine house, boiler house, water filter beds and a large boarding house and several tenements.

The STEAM PLANT consists of two Greene improved engines of 600 horse-power each, and 14 six feet horizontal tubular boilers, in good order.

The WATER SUPPLY is abundant and of the purest quality.

Terms of sale: Five per cent. of the purchase money in cash at the time of sale and the remainder upon the delivery of the deed at the banking house of the Rhode Island Hospital Trust Company, in the City of Providence, on the 25th day of January, 1893.

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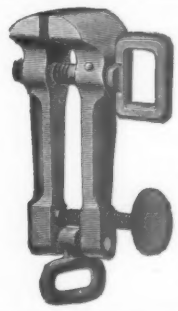

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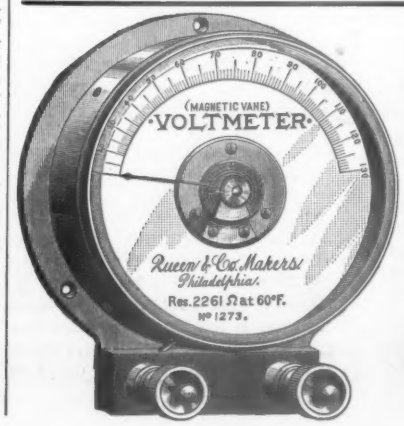

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